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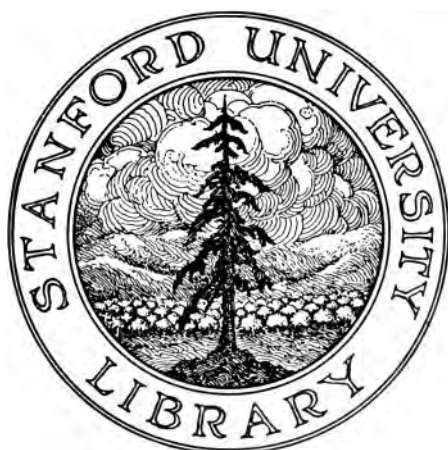
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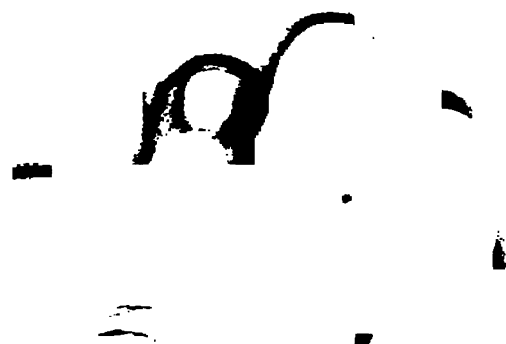
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Baron

THE
Amazon Provinces of Peru
As a Field for European Emigration.

A STATISTICAL AND GEOGRAPHICAL REVIEW OF
THE COUNTRY AND ITS RESOURCES,
INCLUDING THE
GOLD AND SILVER MINES
TOGETHER WITH
A mass of Useful and Valuable Information,
WITH
MAP AND ILLUSTRATIONS.

BY
H. GUILLAUME, F.R.G.S.

Consul-General for Peru, in Southampton,

DELEGATE MEMBER DE LA SOCIEDAD OBREROS DEL PORVENIR DE AMAZONAS
DEL PERU,
MEMBER OF THE ASSOCIATION OF FOREIGN CONSULS.

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LONDON, W.C.

TO HIS EXCELLENCY
GENERAL ANDRES AVELINO CACERES,

President of the Republic of Peru,

WITH THE HOPE THAT IT MAY ASSIST HIM

IN THE NOBLE WORK

WHICH IS THE OBJECT OF HIS LIFE,

viz.:—

THE ADVANCEMENT OF THE INTERESTS OF PERU,

This Work is most respectfully Dedicated,

BY HIS VERY HUMBLE AND OBEDIENT SERVANT,

THE AUTHOR.

PREFACE.



THE present treatise owes its origin to a small pamphlet placed in the writer's hands on the 8th of April, 1886, by Señor Don Alejandro de Ydiaquez, then on the point of embarking from Southampton for Peru. The pamphlet was issued in Lima, December, 1885, by a society known as "La Sociedad Obreros del Porvenir de Amazonas del Peru" (the Society for the Exploration and Colonisation of Peru), which has for its president the enlightened Dr. Albornoz, of the city of Chachapoyas, and the writer was urged to make a translation for the benefit of the English people.

From that time until now the author has unceasingly endeavoured to accomplish that object, having only delayed doing so until he was in possession of further information respecting the vast resources of that fertile country, so as to place a fuller description of it before those for whom it was intended.

It appeared to him that the efforts that have been, and are still being, made by the Society are so laudable that, when the facts become fully known in this country, Englishmen would not be found wanting to join in the important work.

Notwithstanding the many favourable reports made by the English scientific travellers, Clements R. Markham, J. B. Minchin, Simpson, Bates, and others, who have from time to time visited these regions and reported on their great natural resources, it seems incredible that their noble efforts, made for the benefit of the people of Europe, should have as yet borne no fruit; and that this immense territory, so fertile and abounding in the richest mercantile products, which would be of such great value to European industry in general and that of England in particular, should still remain ignored by commercial enterprise.

Not long since, when the subject was prominently brought before one of the meetings of the Royal Geographical Society, by Mr. J. B. Minchin, in a paper giving the result of his travels in Eastern Bolivia, the noble chairman, Lord Aberdare, expressed his opinion as follows:—

“I cannot understand how it is that Englishmen take so much interest in Africa and not in South America. I suppose it is only on account of the spirited adventures of Livingstone and others, which have aroused attention to the country.”

Professor Raimondi, the eminent scientist, lately said:—

“It appears to be a thing incredible that Peru—this land of proverbial wealth—which at the time of the Spanish Conquest filled with gold the chests of the exhausted Spanish Treasury, has been up till recently, and one may say up to the present time, almost a *terra incognita* to the people of Europe.”

The object of this treatise is to set forth in an unbiassed account the interior of the country, and the resources of its vast uncultivated regions, without ignoring the difficulties and obstacles which have to be overcome.

In order to clearly show the physical and geographical position of these regions, resource has been had to the valuable and reliable reports made by Peruvian, English, German, and other scientific explorers, down to the present time.

It will be seen from these reports, that the chief impediment to the development of the resources of the interior of Peru has hitherto been the want of communication with the coast, in consequence of the stupendous mountains which form so formidable a barrier, and seem to say to man, "Thus far shalt thou go, and no further ;" but this gigantic obstacle is now about to be overcome by the extension of the great lines of railway, which will be the means of attracting emigration to the country, and thereby developing its resources, and thus a great impetus to trade and commerce will be given, to the mutual benefit of Peru and the populous countries of Europe.

That Peru is a country desirous of taking her proper place amongst the nations of the world is evidenced by its gigantic lines of railway, which have been constructed at an immense expenditure of toil and money. These works have been designed not so much for the benefit of her scanty population, as for the advantage of the population which, it is hoped, will be attracted thither.

Like her prosperous sister, the Argentine Republic, Peru, unable to colonise these vast territories herself, generously offers them to all honest labourers, who may come

and share with her the vast natural resources they contain, and who will be guaranteed a permanent title to the land equally with natural-born subjects.

It is satisfactory to perceive that the commendable efforts of Peru will probably soon be crowned with success, by means of the Panama Canal. The day when that great work is completed will mark a new era in the history of the country, and she will enter upon a new career of progress and prosperity.

It will be seen from the following chapters how varied and rich are the resources of the country, and that the colonist will not be confined, as in other less favoured lands, to the growing of corn crops, with which the markets of the world are already so abundantly supplied, but will be enabled to cultivate crops in greater demand in the markets of Europe, and which are found in these regions, growing naturally, and in boundless luxuriance.

In the present treatise, the subject of mines has been but lightly touched upon, being so extensive ; the author of the present work is compiling another, dealing exclusively with that subject.

The author begs to acknowledge with deep gratitude, his indebtedness to the following gentlemen :—

Professor Antonio Raimondi and Señor Leonardo Pflücker y Rico, for their kindness in permitting him to translate passages from their works ; Señor Don A. Espinosa, late secretary to the Legation, London ; Don Benjamin Alvarez, Consul-General of Peru, Liverpool ; Mr. A. R. Robertson, Consul for Peru, London ; Herr Jean Nötzli mineralogist and explorer, Cajamarca, Peru ; Mr. Otto

Ringeling, Lima ; Mr. J. D. Osmer, botanist, and others, for the valuable information and assistance which they have so kindly rendered him.

His aim has been to second the laudable efforts made by the illustrious chief of the State, and all patriotic Peruvians, to bring these extensive undeveloped regions of Peru within the orbit of Christianity and civilisation ; and he expresses a fervent hope that at the present time, when emigration forms an all-absorbing topic in this country, the claims of Peru, as set forth in this work, will not be overlooked by those engaged in forwarding the various schemes for colonisation, and seeking favourable homes for the surplus population of Great Britain ; and may that hopeful spirit of enterprise be ever innate in the breasts of Englishmen, as described by the poet Campbell :—

The pride to rear an independent shed,
And give the lips we love unborrow'd bread,

* * * * *

To skirt our home with harvests widely sown,
And call the blooming landscape all our own,
Our children's heritage, in prospect long—
These are the hopes, high-minded hopes and strong,
That beckon England's wanderers o'er the brine,
To realms where foreign constellations shine.

H. GUILLAUME.

PERUVIAN CONSULATE, SOUTHAMPTON,

August, 1887.

The following is a copy of a letter the author has received from Clements R. Markham, Esq., C.B., F.R.S., Secretary to the Royal Geographical Society, &c., &c., the distinguished English traveller and scientist, who for many years travelled in Peru making scientific studies, and who possesses an intimate knowledge of the country.

“21, ECCLESTON SQUARE,

“*May* 10, 1887.

“DEAR SIR,

“I rejoice to hear that you are bringing out a work on the ‘Amazon Provinces of Peru,’ and I trust that its publication will have the effect of promoting colonisation, and spreading a more correct knowledge of the resources of Peru.

“I consider that the slopes of the Eastern Andes, within the Republic of Peru, are very suitable for European colonisation, and offer an admirable field for industrial enterprise.

“Yours faithfully,

“CLEMENTS R. MARKHAM.”

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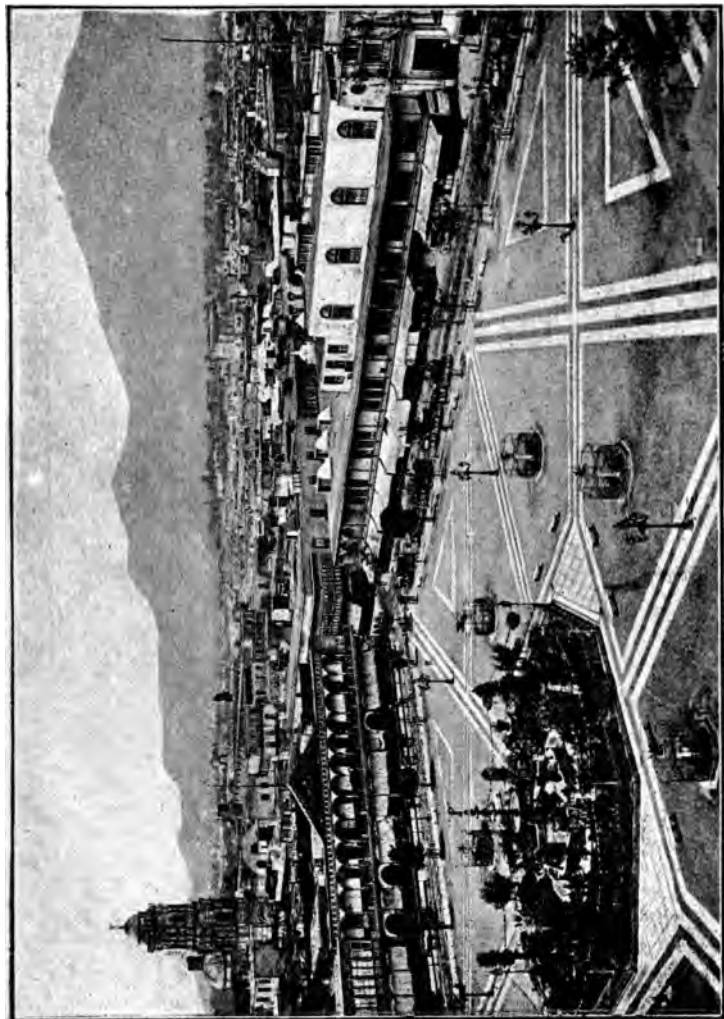
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CITY OF LIMA.

Face page I.



THE AMAZON PROVINCES OF PERU.



CHAPTER I.

Extent, Boundaries, General Description, Climate and History.

EXTENT AND BOUNDARIES.

PERU is situated in South America, between the parallel 1° S. and 19° S. latitude; between 68° and $81^{\circ} 20' 45''$ longitude W. On the west it is washed by the Pacific Ocean, having an extensive coast-line of 1,300 miles. It is bounded on the north by the republics of Equador and Colombia, on the east by the Brazils and Bolivia, and on the south by Bolivia and Chili. The most northern port on the Pacific is Tumbes. The boundary-line commences a short distance north of that port; it runs southward as far as the river Macara, following its course until about lat. 3° , long. 79° , thence it rises in a north-easterly direction by Andoas, to Santa Rosa, which is the extreme northern point of Peru. The line then passes from the river Napo to the Brazilian frontier, which commences at the confluence of the Apaporis with the Yapura, $1^{\circ} 31' 29'' 5$ S. lat., $69^{\circ} 24' 55'' 5$ W. long., thence to the point of juncture of the river Catuhé with the Putumayo, $2^{\circ} 53' 12'' 8$ S. lat., $69^{\circ} 40' 28'' 55$ W. long.; it thence descends, cutting the Putumayo three times, to San Antonio, $4^{\circ} 13' 21''$ S. lat., $69^{\circ} 54'' 00$ W. long., as fixed by the Peruvian Brazilian Commission of 1873. The Commission of 1874 fixed the eastern boundary as follows:—"The line descends the rivers Guaporé and Mamoré, which form the Madera, to a point half-way between the Amazon and

the mouth of the Mamoré ($6^{\circ} 52'$ S. lat), thence it passes east to west to the river Yavari, $6^{\circ} 59' 29''$ S. lat., $74^{\circ} 6' 26''$ W. long., ascending that river to the Marañon."

The boundaries between Peru and Bolivia have never been definitely fixed, but it is understood the line follows the river Beni to the Andes, traversing the lake Titicaca, and thence follows the Andes until it reaches the river Camarones,¹ which river now forms the boundary between Peru and Chili, as determined by the treaty of peace. The area of Peruvian territory is 500,000 square miles, being as large as England, France, Spain, and Portugal put together.

CONFIGURATION OF THE COUNTRY.

The Andes range of mountains, after quitting Bolivia, branches into three colossal chains, extending inland for a distance of 250 miles, viz., the western chain, which is known as the Cordillera de la Costa (coast range of mountains), the Central Cordillera, which attains a height of 20,000 feet, with passes at 15,000 feet, and the Andes,² or Eastern Cordillera, which is of lesser elevation than the other ranges. Peru is therefore divided into four distinct longitudinal regions, viz., the Coast, the Puna, the Sierra, and the Montaña.

(1.) The first, lying along the Pacific slope, enjoys a sunny sky, but has the peculiarity that rain never falls there, and thus, for the want of moisture, it is for the most part a sandy desert; but where it is broken by streams and valleys there is surprising fertility, and the sugar-cane and cotton-plant grow in great luxuriance.

(2.) The Puna comprises the high table-lands and cold regions lying between the coast and central ranges, which is the home of the Peruvian sheep, the llama, alpaca, vicuña, &c., and also of the chinchilla, a small animal like a rabbit,

¹ Chili holds territory north of this boundary to the river Sama until 1893.

² The name Andes is derived from the Quichua word *Antasuya*, *Anta* signifying metal and *suya* a district. In common parlance *suya* was dropped and the termination *a* in *Anta* converted into *is*. The Spaniards, according to their practice of corrupting the words of the Quichua language, substituted *Andes* for *Antis*.—(Garcilasso de la Vega.) The historian, General Miller, however, supposes that it was from "Andenes," as the steps or terraces, which were cut in the mountains for the purpose of cultivation, were called by the Spaniards.

well known for its valuable fur. It is subject to rain and snow in the winter season.

(3.) The Sierra is also a high table-land of lesser elevation, lying between the central and eastern range, and has a temperate climate, being subject to snow and rain during the winter season. This is the region for the growth of corn, barley, potatoes, and other European products, and here the valuable Peruvian sheep are reared, as in the Puna. It is also the region of mines and precious metals. These high lands extend from 50 to 100 miles, and are about 950 miles in length. In these regions are situate the cities of Cuzco, 11,380 feet above the sea, Ayacucha, and Cerro de Pasco.

(4.) The fourth region—the Montaña or forest country—is that immense region lying along the slopes of the third or eastern range of the Andes mountains, and extends to the Amazon. It remains as yet in its primitive state of nature, and is extremely interesting from the grandeur of its magnificent forest scenery. It has been described by many writers as worthy of the name of “the Ophir of Solomon,” on account of the many rich and valuable products which abound there. It consists, for the most part, of one boundless forest, in which flourish the india-rubber and cinchona-trees, as well as the coffee, cocoa, and vanilla, while torrent streams from the mountain bring down with them rich deposits of gold. The great network of rivers in this region offers a wide field of enterprise to steam navigation by way of the Amazon; thus one of the richest quarters of the globe is waiting to be developed.

CLIMATE.

By reason of its lofty ranges of mountains, Peru, although situated in the tropics, has the advantage of enjoying a great variety of climate. In many parts the salubrity of the climate is such that it is even superior to some of the healthiest cities of Europe, and offers, according to the latitude and peculiar circumstances of the localities, desirable advantages to European colonists. On the Pacific coast, at Lima and other towns, the heat of the sun is tempered by cool S.E. breezes, and the temperature throughout the year is very

suitable to Europeans. At Lima the sun is scarcely ever hidden by clouds for a day throughout the whole year. The maximum temperature at Lima in the summer season is 78° , and in the winter season (June, July, August) 59° . The so-called winter season is like an English spring.¹ The Pacific coast of South America is much lower in temperature in comparison with the eastern or Brazilian coast of the same latitude, by reason of the so-called "Humboldt current," which, flowing up from the Antarctic regions, and running parallel to the coast, has the effect of lowering the temperature. Mr. John Ball, F.R.S., in his isothermal map lately published, draws particular attention to this current, by which the climate of Peru is so much benefited. The mean annual temperature of the Amazon valley from Manaos to Tabatinga is 80° . Moyobamba, which stands 2,700 feet above the sea, has a mean annual temperature of 77° . The climate here is delightful. Nature is so prodigal that everybody can get a living except physicians. Chachapoyas, another most delightful town, is situated 7,600 feet above the sea-level, has a temperature ranging from 40° to 70° , with a mean annual temperature of 62° Fahr.

The Pampas of Sacramento at Sarayacu has a minimum and maximum temperature of 75° and 85° ; the altitude above the sea at Sarayacu being 165 mètres = 542 feet. The eastern provinces, being at a considerable elevation above the sea-level, no part can be called unhealthy. The interior of the forests, through which the rays of the sun have not penetrated for centuries, are as free from malaria as the mountains. There are two seasons in the Montaña or forest country—the dry season, from May to October, and the rainy season, from November to April. The largest amount of rainfall occurs in February and March; the quantity of rain that falls is probably about seventy inches. The heavy rains carry off all the decaying matter, and the trade winds, which are continually blowing towards the Atlantic, follow the course of the river, and, combined with the current of the river, no doubt cause the salubrity of the climate along the Amazon. The same may be said

¹ In the mornings of the winter months the sky along the coast is frequently obscured by fog, "niebla," or by a falling mist called "garua," which is dispelled by the sun at noon.

of all the large tributaries to the Marañon, as the Napo, Ucayali, and Huallaga; malarial fevers are almost confined to the small rivers.

Professor Orton¹ writes :—" Epidemics are unknown, and dysentery is of comparatively rare occurrence on the Marañon. I repeat what I have said elsewhere, that the entire main tract of the Amazon, from Para to Borja, but especially the Marañon, is as healthy as any tropical river in the world. The main river is certainly as healthy as the Mississippi. In my judgment, the journey is as healthy as a pilgrimage to Egypt, and far more refreshing than any number of wanderings in the Adirondock. I have crossed the continent three times, and the Andes six times, and have not been ill a moment."

THE SALUBRITY OF THE SIERRA.

Mr. Clements R. Markham² writes :—"From Cerro de Pasco there is a considerable descent southwards to the city of Jauja, the climate of which is said to be almost perfect for patients with pulmonary complaints. It is a charming little sierra town, and near it, on the eastern watershed, is Tarma, another sierra town, beautifully situated in an amphitheatre of mountains, clothed to their summits with waving fields of barley. The climate is delightful, so that no doctor can gain a living, and the one resident surgeon depends on a salary from the tax on spirits and the tolls on the bridge of Oroya."

It was at the above-mentioned sierra town that Don Manuel Pardo resided for some time for the benefit of his health. He has written a pamphlet, in which he has given a full description of this delightful place, its mineral wealth, and its salubrious and bracing air. English and American doctors have recommended patients to the Andes mountains, and magic cures have been effected of aggravated forms of phthisis pulmonalis.

Mr. Hilbeck, the Consul-General for Germany in Peru, with whom the author had the honour of making acquaintance on the 10th March, 1887, at Southampton, on his

¹ "The Andes and Amazon," Dr. James Orton. New York : Harper Bros.

² "Peru," Clements R. Markham, C.B. London : Sampson Low & Co., 1880.

returning to Peru, stated that he had resided thirteen years at Piura and Caxamarca, and had never experienced any illness whatever. "Peru," he said, "is one of the healthiest countries of the world, and is highly suitable for European emigration, which is so much needed."

Mr. Jean Nötzli, an eminent geologist and mining engineer, informed the author that he had resided fifteen years in the Amazon regions and interior parts of Peru without ever having suffered any ill effects from the climate, but that he had always enjoyed the best of health there. (*See* his report, Chapter V.)

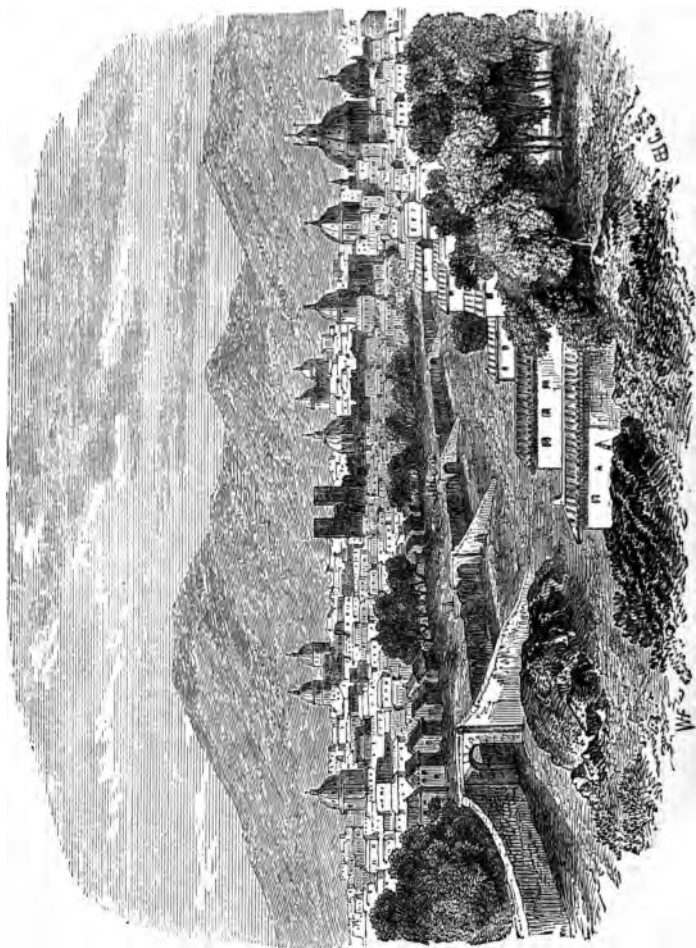
LONGEVITY OF LIFE AMONGST THE INDIANS.

Cases of longevity of life are numerous. The Indians are, on the average, remarkable for longevity, though they frequently shorten their lives by the intemperate use of strong drinks. Instances are not rare of Indians living to 120 or 130 years of age, and retaining full possession of their bodily and mental powers. Stevenson writes as follows: "On examining the church registers of Barranca, I found that within an interval of seven years, eleven Indians had been interred whose united ages amounted to 1,207, being an average of 109 years to each. In the year 1839 there was living in the valley of the Jauja an Indian who, according to the baptismal register shown to me by the priest, was born in the year 1697, being 142 years old. He himself declared that he had not for the space of ninety years tasted a drop of water, having drunk nothing but chicha.¹ Since he was eleven years of age he had masticated coca at least three times a day, and had eaten animal food only on Sundays; on all the other days of the week he lived on maize, quinoa, and barley. The Indians retain their teeth and hair in extreme old age, and it is remarkable that the latter never becomes white and very seldom even grey. Those individuals, whose advanced ages have been mentioned above, had all fine black hair."

MINERAL SPRINGS.

No country is so bountifully supplied with so many mineral and warm springs as Peru. There are 120 mineral

¹ Chicha, the fermented juice of maize or mandioca.



CITY OF CUICO,

Face page 7.

springs and warm baths, ranging from 16° to 91°. They are situated principally in the central regions—viz., Sierra and Cordillera, and they succeed each other almost without interruption from one extremity of the Republic to the other.

ANCIENT HISTORY OF PERU.

The history of the conquest of Peru has been recorded by the masterly hand of Prescott, but its ancient history, previous to the time of the Incas, remains yet to be written. At the time the Spaniards entered Peru they found it under the Inca¹ dynasty, which commenced with Manco-Ccapac² about three centuries previously. The name Peru was not known to the natives, the country was so named by the Spaniards, but historians are not agreed upon the source of its derivation. According to Garcilasso de la Vega, Peru was the ancient Ophir, whence Solomon drew such stores of wealth, which has in time been corrupted into Phiru, Piru, Peru. But it is more generally believed by Peruvians that their country derives its name from Viru, an Indian valley and river of the same name in the north of Peru, near Trujillo, where Pizarro formed his first city, and named it after his birthplace in Spain. The Indians called that district Viru, and therefore the old Spaniards believed it to be the name of the whole country, and which has since been corrupted to Peru. *Ttahuantin-suya*,³ or the four provinces, was the name the Incas called their country, which was divided into four provinces, or departments, which were subdivided into smaller sections, similar to the hundreds and tythings of our Anglo-Saxon forefathers. Cuzco⁴ was the capital where the Incas built their Temple to the Sun, which they worshipped and called their father, and denominated themselves "Children of the Sun."

Prescott says: "Cuzco was the 'holy city,' the great Temple of the Sun was the most magnificent structure in the New World, and unsurpassed, probably, in the costliness of its decorations by any building in the Old. The great temple was studded with gold plates, and the broad

¹ The word *Inca* in the Quichua dialect means *king* or *lord*.

² *Ccapac* signified great or powerful. It was applied to several of the successors of Manco.

³ *Ttahu* means four, *suya* a province.

⁴ *Cuzco* means navel; signifies here the central region.

parterres adjoining it sparkled with gold in the many forms of vegetable life, which were skilfully imitated in gold and silver. On certain festivals the Incas used to exhibit their valuables in the great square at Cuzco, and the Spanish historian Sarmiento writes :—"It is certain that neither in Jerusalem, Rome, nor in Persia, nor in any other part of the world, was there ever collected in one place such a profuse magnificence of treasure in gold, silver, and jewels as at this place Cuzco."

With respect to the Inca dynasty, the historian Trezier states he saw the pictures of the Inca emperors painted by the Indians at Cuzco, in the proper habits, as large as life. He points out that Garcilasso de la Vega and Montalvo only mention eight emperors, whereas, according to the pictures, there were twelve, whose names with those of their wives were as follows :—

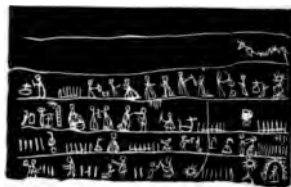
A.D.	THE EMPERORS.	THEIR WIVES.
1.—1021.	Manco Ccapac.	Mama Oella Vako.
2.—1061.	Sinchi Lloccac.	Kora.
3.—1091.	Lloque Yupanqui. ¹	Anavarqui.
4.—1126.	Mayta Ccapac.	Yachi.
5.—1156.	Ccapac Yupanqui.	Klava.
6.—1197.	Inca Lloccac.	Mikay.
7.—1249.	Yahuar Huaccac.	Chisia.
8.—1289.	Viraccocha.	Runtu.
9.—1340.	Pachacutec.	Anavarqui.
10.—1400.	Inca Yupanqui.	Chimpa Oello.
11.—1439.	Tupac Yupanqui.	Mama Oello.
12.—1475.	Guayna Ccapac.	Koia Pilico Vaco.
1526.	Huaacar ² and Atahualpa, who were jointly reigning at the time of the conquest, ³ the former over the northern part and the latter over the southern part of the kingdom. ⁴	

¹ *Yupanqui* signifies rich of all virtues.

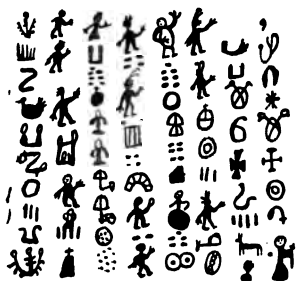
² *Huaacar* in the Quichua dialect signifies "Cable." The reason of its being given to the heir-apparent is remarkable. According to the Spanish writers Zarate and Garcilasso, Guayna Ccapac celebrated the birth of the prince by a festival, in which he introduced a massive gold chain for the nobles to hold in their hands as they performed their national dances. The chain was seven hundred feet long, with links nearly as big round as a man's wrist.

³ In 1780 an unsuccessful attempt was made to restore the Inca dynasty by the Inca Cundurcimca, who assumed the name of Tupac Amaru. He succumbed after occupation of six provinces, and was sentenced to a very cruel death.

⁴ Prescott says :—"Their father, Guayna Ccapac, so fondly loved his younger son, Atahualpa, that on his death-bed he, contrary to the



Found at Sicasica (Reduced to one-fifth).



Found at Paucartamba (Reduced to one-fifth).

SPECIMENS OF ANCIENT PERUVIAN WRITING.

These writings, found in tombs, are written on tissue which had previously been dipped in gum or other preservative. The upper plates represent the crucifixion of Christ, both are written in the same ideo-graphical system that the Indians knew before the conquest.

ARCHÆOLOGICAL REMAINS.

Throughout Peru there are extensive archæological remains, consisting of ancient fortresses, aqueducts, and curiously-carved rocks covered with hieroglyphical signs, respecting which no information has ever been obtained from the descendants of the Incas, and which remain to this day a problem for the scientific to solve.¹ It is the opinion of Dr. Thomas J. Hutchinson,² late H.B.M. Consul to Peru, that these ancient monuments attest the former existence of a powerful and civilised empire many centuries anterior to the era of the Inca dynasty. He bases his opinion upon the many beautifully-executed objects of art in terra-cotta, silver, and gold, the exquisite workmanship displayed in the construction of the buildings, &c., which cannot be considered the work of savages but that of a people possessing considerable knowledge of scientific and mechanical art, and says that these remains and relics bear a most striking similarity to the description given by Dr. Schliemann of those discovered at Homer's Ilium. He is supported in his opinion by Dr. Archibald Smith, another explorer of Peruvian antiquities, who says :—"The gigantic architecture of Peru points to the Cyclopean family, the founders of the Temple of Babel and of the Egyptian Pyramids." In general, however, modern Peruvians do not take any great interest in the study of antiquities. Notwithstanding, there are several very fine collections in Lima owned by private persons ; worthy of mention are those of Dr. Macedo and Señor Saenz. It is satisfactory to notice that these relics of past

established usages of the realm, divided the empire between his two sons, and urged them to live in amity with each other, while he recommended harmony between the successors to his authority. With his dying breath he subverted the fundamental laws of the empire, and left in this very division of it the seeds of inevitable discord. This it was that led to the country falling so easy a prey to the Spanish adventurers."

¹ Mr. A. Espinosa says :—"As far as the external appearance and the system of construction of the Incas are concerned, there is in my opinion good reason to believe that there is some close relationship between the culture of the Incas and of the Egyptians and Assyrians."

² Dr. Hutchinson has published a work entitled "Two Years in Peru," in which he gives a most interesting account of the archæological remains of the country.

ages are beginning to receive attention at the hands of the Peruvian Government, as well as of certain private persons, and collections are now being made of these rare archaeological relics, which lead to the hope that science will some day be rewarded by the discovery of the missing link that will throw light on the hidden history of this interesting country.

MODERN HISTORY OF PERU.

The discovery of America by Columbus in 1492 excited a spirit of adventure in Spain, and an eager desire was kindled in the breasts of Spaniards to profit by the work of the great navigator. Thereupon expeditions went forth, and the adventurers were rewarded by the conquest of Mexico. Francisco Pizarro, an officer of intrepid courage, and possessing remarkable powers of endurance, who had taken part in the conquest of Mexico, started, in the year 1524, on the project of extending Spanish conquests in the southern coast of America. His first voyage resulted in making valuable discoveries of the country, and he returned for reinforcements. In February, 1531, Pizarro again sailed from Panama with a small fleet of ships, and with a force consisting of 186 soldiers, of whom thirty-six were horsemen, and succeeded in effecting a safe landing at Tumbez, in the north of Peru. Fortunately for Pizarro, a civil war was then raging between the two royal princes of the Inca dynasty, Atahualpa and Huascar, and, under the pretence of aiding the former against the latter, and using great strategy with his small force, he accomplished the marvellous feat of conquering the whole country from the Incas without even a battle. History does not relate so great a prize being so easily won by any nation. Peru, thereupon, became subject to the Spanish Crown, and remained one of her richest possessions from the year 1533 until the 23rd June, 1820. In the year 1810 the Spanish colonies began to rise against the mother country. Chili first obtained her independence, and in 1820 General San Martin, a native of Buenos Ayres, who liberated Chili, came with an army to Lima and drove out the Spaniards, and the independence of Peru was proclaimed on the 28th of July, 1821. San Martin was named Protector of Peru, but

resigned his authority in August, 1822, upon the arrival of Bolivar, the Columbian General, who entered Lima in February, 1824, and was made Dictator of Peru. In 1825 Bolivar resigned the dictatorship, having previously contrived to separate the southern provinces from the northern, and to convert the latter into a new republic, which adopted the name of Bolivia.

There is one name which will be ever memorable in the annals of the struggle for independence in South America,—that of Lord Cochrane (Earl Dundonald), whose prowess was one of the chief causes in enabling Peru to shake off the yoke of the Spanish dynasty. This brave English nobleman, as admiral of the Chilian fleet, sailed from Valparaiso in September, 1819, to assist Peru. After displaying indomitable pluck in fighting the Spaniards and capturing their treasure ships, he challenged the Viceroy to fight him ship for ship, which, of course, was not accepted. But Lord Cochrane's greatest feat was the capturing of the Spanish war frigate *Esmeralda* in Callao harbour. He accomplished this brilliant achievement of naval tactics by means of his boats. Boarding the frigate at night-time, himself leading his men, he captured the *Esmeralda* and all on board, though the frigate at the time, besides being guarded by twenty-two gunboats, was protected by the powerful guns of the fortress. This gallant enterprise took place at midnight November 5, 1820. Englishmen have reason to remember with pride this episode of the bravery of their gallant countryman, whose name is indelibly written in the history of the South American Republics; and Peruvians will ever remember with gratitude the great services rendered to their country by this great and brave Englishman, and in consequence have a more kindly feeling towards his countrymen than towards those of other nationalities.

For several years after gaining its independence Peru had to contend with many difficulties, caused by the struggles of ambitious military chiefs, and the progress of the young republic was materially checked. In the year 1865, General Prado was called to the presidency, and had the advantage of having in his ministry a really eminent statesman, Don Manuel Pardo, who afterwards became President; war

then broke out with Spain, and it was under General Prado's Government that Peru successfully repelled the attack of the Spanish fleet on the 2nd of May, 1866. The gallant manner in which the Peruvians fought in that severe struggle, and the heroic acts performed by them, will ever be remembered as one of the most brilliant achievements in Peru's history. On the 2nd of August, 1872, Don Manuel Pardo was elected President. During the Government of this enlightened statesman, great reforms were effected; education was promoted and placed on a satisfactory basis, the great lines of railway designed to traverse the Andes were prosecuted with much vigour, and many improvements were made in the development of the country. It must be said to his memory that Don Manuel Pardo was one of the greatest statesmen who ever ruled in South America. It is to this enlightened statesman that Peru owes the wise project of introducing European immigration, and it was through his efforts that the colony of poor Italians was successfully established in the Chanchamayo valley.¹ It is not the purpose of the present treatise to open up any matters in connexion with the late unfortunate war, which commenced in 1879 and was concluded by the treaty of peace of Ancon, dated 30th October, 1883. It seems only necessary to say that the struggle has left behind it remembrances of heroism and bravery displayed by the sons of Peru, who sacrificed their lives to their country's cause, and the name of the intrepid Admiral Grau, in connexion with the ship *Huascar*, will be ever recorded in the history of Peru as that of one of its greatest heroes,—

“Who nobly fell,
Disdaining fear, and deeming light the cost,
Of life itself, in glorious battle lost!”

¹ The colonisation has so successfully progressed, that there are at present very large and valuable sugar estates. Several good roads are already constructed or being made, and lately the building of a narrow gauge railroad from Tarma to Chanchamayo has been projected connecting it with the main system of railroads. The crops in the Chanchamayo are so abundant that in some cases they cannot be all gathered in from want of labour and means of conveyance. Justified hopes are being entertained that when the net of roads is finished, or the railway built, a great impulse will be given towards approximating these regions to the civilised world by means of the navigable Amazon river.—(A. Espinosa.)

And also the name of Captain (now Admiral) Aurelio Garcia y Garcia is worthy of mention, in connexion with the daring capture of the Chilian transport *Rimac* by the wooden despatch-boat *Union*.

On the 3rd of June, 1886, General Andres Avelino Caceres was unanimously elected President. No man was ever more worthy of this exalted position. Under this patriotic and much-beloved President, Peru enjoys order and peace throughout its territories, and the aspirations of both Government and people are consolidated together for the maintenance of peace and the development of the resources of the country. The progress that has been made since the late war, both administratively and commercially, is in itself a testimony to the recuperative powers of the nation.

CHAPTER II.

General Description of the Amazon Provinces.REPORT OF THE EXPLORATION AND COLONISATION
SOCIETY OF THE AMAZON PROVINCES OF PERU.

THE Society issued a report of its proceedings at a meeting held at the Athenæum, Lima, on Dec. 12, 1885, when the president, Doctor Albornoz, gave a history of the Society from its commencement, and also a full description of the resources of the Amazon Provinces of Peru, which the author has translated, and which forms the subject of the present chapter. The president stated that the Society was founded in the year 1858, under the Bishop of the diocese of Chachapoyas, Dr. Pedro Ruiz, for the object of promoting industry, commerce, Christianity, and civilisation in the Amazon regions of Peru. A full report was given of the explorations and work done by the several expeditions which had been fitted out at the Society's expense since its foundation, for carrying out the work of colonisation, particularly the cutting of a road through the forests, starting from Chisquilla, with the object of making a short route for commerce from the beautiful regions of Chachapoyas to the Amazon, or Marañon,¹ by the Cahua-panas river, which joins the Marañon below the Pongo de Manseriche.² The worthy president made an earnest appeal for European immigration in the following words:—

THE NECESSITY FOR IMMIGRATION.

“No country in the world can be better endowed by nature with rivers than Peru. On the one side it is favoured with the Pacific Ocean; on the other by numerous rivers,

¹ Marañon is the term given to the Upper Amazon, west of Navta, and the whole extent of its course through Peruvian territory.

² *Pongo* is the Indian word for “end of the hills.”

which beautifully part its territory, and eventually unite to form one gigantic stream, which majestically goes and salutes the Atlantic. The existence of the King of Rivers, with its numerous tributaries, would be a great advantage to any country; more especially, then, must it be the case in Peru, where the district through which it flows is rich in every kind of mineral and vegetable product.

"The want of inhabitants is the cause that year by year there is lost millions of pounds' worth of valuable natural products, which arrive at maturity only to fall to the ground, and serve as soil for reproduction the following year. Nothing has been as yet done to remedy this state of affairs, and our forests remain still deserted; we want an abundant immigration to help us gather our produce. Fortunately, our necessity coincides with the excess of the cities of Europe and the United States; the former being at present obliged to seek in Africa a soil for its population. A more propitious opportunity cannot be presented; we must avail ourselves of it without loss of time, and endeavour to attract to our country that current of emigration, by showing the people that they can find here a more comfortable position than elsewhere.

"Our montañas (the name given to the forest regions) being of so varied a nature, the colonists can select that part which will suit their convenience, and with respect to the extent of suitable land at their disposal, the pampas of Sacramento¹ can accommodate millions of people. But we must first prepare the places to receive the

¹ *Pampas* means plains, but these are thickly covered with trees. The pampas of Sacramento comprise the region lying between the rivers Ucayali, Huallaga, Pachitea and Marañon. Its length is 300 leagues (900 miles) from north to south, and from 40 to 100 leagues, or from 120 to 300 miles, in width. Lieut. W. Smith, R.N., speaking of it in his noted travels, says:—"The pampas of Sacramento was so called from its being discovered by some newly-converted Indians in 1726 on the day of the festival of the Corpus Christi. It is remarked with apparent justice in the 'Viagerio Universal' that the two continents of America do not contain another country so favourably situated and so fertile. The climate seems very like that of the island of Madeira. During our stay at Sarayacu we registered the thermometer three times a day, and its minimum and maximum were 75° and 85° Fahr., and the sun at this time passed over our zenith. A hill called San Martias, near Mayo, is said to produce gold."

immigrants, by putting the same in communication with other towns of the interior. This has been the principal object which the Society has had in view, and its first aim is to open a road through the forest to the Cahuapanas river. Its intention is to endeavour to populate the upper part of the Marañon, placing the same in communication with other towns in the interior, and particularly with the town of Chachapoyas, by which means the new places will be supplied with everything necessary for their first wants.

"There are no real obstacles which oppose the gradual development of commercial relations. We do not commence competition with one existing beforehand; therefore, we can bind together freely as much as we wish, placing ourselves in accord with persons really interested in the progress of these virgin regions.

"The Society wishes to introduce immigration in a methodical way, by opening a road to Cahuapanas, establishing a town there, and preparing ground for agriculture. Naturally the shortest way will be chosen for immigration, that is, by the river Amazon, and this route should be selected as being the most convenient.

"The variety and favourableness of the climate, the fertility of the soil, and the generosity and good disposition of the Peruvian people, are, moreover, advantages which should attract individuals from all parts of the globe. They will find an affectionately disposed country, as brothers solicitous for their welfare; and they, moreover, acquire the ownership of the soil without any further stipulation than that of each person cultivating his own portion of it. The distribution of the land is made per head, each father with a family has a right to receive as many portions as there may be members of it. But we must seek them, tell them the advantages we can proportion to them, illustrate our real position, and please them with our kindness and protection. That is the only way we can influence labourers, if we wish to progress, and enter in the glorious path which Providence has destined for us.

"No country has such advantages to offer to immigrants as we have: a soil most fertile,—natural riches heaped upon it; a climate unequalled. Our proverbial kind hospitality, and everything that is desirable in this world,

we place at the disposal of those who wish to come and live with us."

SITUATION OF THE REGIONS OF CAHUAPANAS.

"This beautiful, rich region is bounded on the north by the Marañon, and by the Cahuapanas on the east. Its situation could not have been more favourable; lying on the upper part of one of our largest rivers, it is not subject to inundations its soil is most fertile, and its natural products of the richest kind. There are pampas and immense valleys which delight the eye, evoking a provocative desire to cultivate them. Its temperature is most agreeable, and it is altogether most healthy, as has been fully testified by the several expeditions, and by the fact that no one contracted any disease or illness—and this in spite of the hard trials, exposures in all weathers, and great privations supported for many months in the nine expeditions that have taken place. It would be impossible to fully describe the invaluable advantages this locality possesses."

CHACHAPOYAS.

Chachapoyas, in particular, has great attractions—a pleasant and benign climate, a perpetual spring, an ever-verdant vegetation, which, combined with the cultured and generous disposition of its inhabitants, make the city a most enjoyable place, in which all live as if they were members of one family. We do not know any other part of the Republic more abounding in food than that of the Amazon Department; nothing is wanting which can satisfy the most delicate taste. Everything grows at home, without sending outside the Department for food. Its products can be augmented indefinitely, to satisfy thousands of inhabitants, and also those of the Marañon. Professor Orton says of the city of Chachapoyas:—"Perched 7,600 feet above the level of the sea, Chachapoyas possesses a delightful and equable climate, ranging from 40° to 70°, with the mean temperature of 62° Fahr. Here for the first time we ate bread made from the native flour. The people, to the number of 5,000, scratch the ground with a wooden plough. There are signs of valuable mines of gold,

cinnabar, lead, limonite, and grey copper ore containing silver is found in the vicinity, while mountains of salt occur at San Carlos, twenty-five miles distant north-west. Chachapoyas is the best-built and cleanest city west of Mañaos. The city is regularly laid out; it contains a barrack for soldiers, a monastery, a cathedral, and a resident bishop, whose see extends from Moyobamba to Cajamarca."

MOYOBAMBA.

The same author says:—"The city of Moyobamba stands in a most luxuriant place, with an altitude of about 2,700 feet, and a mean annual temperature of 77°; the climate is delightful. Nature is so prodigal that everybody can get a living except physicians." There are two mineral springs at 106°, and also two sulphur springs at 30° and 84°. Grapes, sarsaparilla, vanilla, india-rubber, and copal grow spontaneously, but are not gathered. The bombonaje, or screw-pine, the leaves of which are so extensively used at Moyobamba in the manufacture of hats, is a tree seven feet high; it grows extensively at Moyobamba, between the river Ucayali and the Andes, and largely at Rioja and Tarapoto. The distance from Moyobamba to Chachapoyas is forty leagues, for a hundred miles of which in a stretch there is not one inhabitant. The only villages on the route are Rioja and Tambo. The highest point is Pointa Piskohuañua (*i.e.*, the place where birds die), rising 11,000 feet above the sea. It consists of dark brown slate, with lias ammonites. It is the range which divides the waters of the Upper Marañon from the affluents of the Huallaga, which, meeting the more westerly sierra, form the terrible cataracts above the Pongo de Manseriche.

ANIMALS OF THE MONTAÑA.

Horses, cattle, sheep, pigs. Horses are reared at Cajamarca, and mules¹ of excellent quality at Piura. The llama, which is used as a beast of burden in the mountains, the vicuña and alpaca, all of which produce the most beautiful

¹ The mule is a very important animal in Peru, and without it the steep ascents of the Andes would present insuperable obstacles to intercourse between one place and another.

wools. There are several species of deer (venados or luássa), which exist in large herds; their flesh is excellent. Rabbits, the peccary or wild hog, and other animals are found in this district.

BIRDS.

The turkey (carassow or pari on the Napo), pacharaca (or small pheasant), guanána, or beautiful goose, fowls, ducks, pigeons, toucans, parrots, &c., and all sorts of game birds. The condor is the largest bird of the vulture kind in Peru; its haunts are in the lofty elevations of the Andes. It will often attack animals with impunity.

FISH.

There are about eighteen specimens of the finny tribe found in the Marañon. The principal fish is the pira ruca, or cod fish; it is the universal diet on the Amazon. It sometimes attains the length of ten feet, and weight of 100 lb. Fish are caught by the natives either by hook or by means of the barbasco, a narcotic plant, the bulbous roots of which are bruised and thrown into the small streams, which in a short space of time so stupify the fish that they may be taken by the hand floating on the surface.

The vaca marina, manatee, or sea-cow, which resembles the seal, is about seven feet long and six feet round the body in the thickest part. It is found in the Ucayali and Huallaga rivers, and the natives harpoon it. Its flesh is greasy, and has the appearance of pork. It is boiled and stewed and made into sausages. A large one will yield 50 lb. of oil from its fat. The blade-bone forms a spade, and is constantly used as such by the natives, and it is not a bad substitute. It has a semicircular flat tail, and behind the head are two oval fins, beneath which are the breasts, which yield a white milk.

There is a sort of crab (camarones), the flesh of which is very tender. The Peruvians prepare of both fish and camarones exquisite national dishes, called "cebiche" and "picante."

TURTLE.

The river turtle (tabaraga or charupa, as the Indians call it) forms an abundant supply of excellent food. They are found in immense quantities on the Pacific slopes, and in all the rivers which fall into the Marañon, and in that mighty river also; in the dry season every bank and beach is covered with them. They are taken and deposited in ponds, and kept for use at all seasons of the year. The turtle is very prolific, and lays its eggs from the beginning of July to the end of September. When the Ucayali is at its lowest the beaches are said to appear paved with turtle. The eggs remain fifty days before they are hatched, and are a very valuable product to the Indians, for from them they make an oil which supplies them with light at night, and they also mix it with their food; it is also one of the principal articles of commerce all along the Marañon; it is called manteca. The oil is made in the following manner:—A large quantity of eggs are thrown into a canoe and smashed with a kind of four-pronged fork. The skins are then cleared off and thrown away, the canoe is then filled with water to within three or four inches of the gunwale, and left half a day exposed to the heat of the sun, when the oil becomes separate, and floats upon the water; it is then skimmed off with shells, put into jars, and carried to a cauldron, in which it is boiled until it attains a bright, clear, yellow colour; it is then ready for use or exportation.

VEGETABLE PRODUCTS OF THE MONTAÑA.

The vegetable products of the eastern slope of the Andes rival in value, beauty, variety and fragrance those of any other part of the world. As the elevation becomes greater the tropical plants and flowers disappear, giving place to all the vegetable productions of the temperate zone. There are two classes of productions, natural and cultivated. Amongst the natural are the following:—Caucho (from which india-rubber is obtained, at present the most important industry), cocoa, cascarilla,

cinnamon, coffee, campeche, copaiva, mandioca, vegetable ivory, sarsaparilla, indigo, tamarinds, almonds, gums, resins, storax, bees-wax, Tonka beans, bombanaje (the leaves of which are used for making the celebrated Panama hats, &c.). From the *Coca* plant the natives prepare their favourite stimulant called ypadú; with this beverage they perform a prodigious amount of labour, travelling for days without fatigue or food. There are extensive groves of coca in all parts of the country, and one has only to gather what nature has sown. A full description of this plant will be found in another chapter. *Coffee* of a very excellent quality grows at Moyobamba. *Vanilla* improves by cultivation, which can be carried on on a large scale. The same with *Cascarilla*; it is an indigenous plant, and it is the richest in quinine of cultivated plants. *Tobacco* is of excellent quality, and in some parts, as in Jaen, it is superior to that of Havanna. The *Cotton* plant has not its rival in the world. It grows luxuriantly on the Huallaga, particularly at Tarapoto, and on the Ucayali. The natives make a cloth of it called tocuyo and lienzo, of which tunics are made. The spinning wheels are of the rudest construction. *Rice* grows exceedingly well, and nowhere does the sugar-cane grow so luxuriantly. Cochineal is produced at Amatape (near Payta), and orchilla is exported from Payta.

FRUITS.

The orange-trees of Moyobamba have no rival in the world. The trees bloom all the year round. The grape vine bears three crops a year, and pine-apples grow to the weight of 20 lb. and are of a most delicious flavour. The palta or alligator pear is one of the most delicious of fruits, and grows at Moyobamba. Guavas, figs, olives, also abound.

VEGETABLES.

Maize, rice, beans, peas, potatoes, onions, mountain cabbage, quinoa or spinach, yuca, yellow potatoes (an excellent kind, unique in Peru), &c., grow freely in the country.

MATURITY OF CROPS.

The soil of the Marañon is a stiff loam, and vegetable mould is in many places 20 feet deep. Maize, peas, and yucas are produced in four months, rice in five, sugar in seven, plantains in nine. The sugar-cane only needs to be planted once, as the crop is perpetual; the canes often grow to the height of ten mètres (33 feet).

THE GOLD-WASHINGS ON THE TRIBUTARIES OF THE MARAÑON.

“The rivers wash down gold in nuggets and fine dust. The rivers Santiago and the Patohuachanu, which flow from Equador, are the most important for the richness of their deposits.¹

“From the former of these rivers one of our ancestors took away several flasks of gold, which formed the offerings the Indians made him while he was among them as Curé. He had been to the gold washings, and saw the abundance of gold, and the facilities for extracting it, as the natives dug trenches in the rivers. When Col. Secada was Prefect in the Loreto Department, there came to Moyobamba six individuals with 14 lb. of gold, which had been taken out of the Santiago in eight days; but during that time only three of them were occupied in extracting the gold, the two acted assentinels, being very vigilant with their muskets, while the other man undertook the cooking of the food. There lies in the Government offices the proposals for an expedition which Señor Secada suggested should be organised, which he sent to the capital with an ounce of gold as a sample of the notable find. Besides other instances, we have the following:—A party of several individuals, for the most part foreigners, proposed to settle on the Santiago to wash gold; but as the tribe of Huambisis, who were in the

¹ Prescott says:—“Gold was gathered by the Incas from the deposits in the streams. They extracted the ore also in considerable quantities from the valley of Curimayo, north of Cajamarca, as well as from other places.



COTON WASHING ON THE RIVER URUBAMBA.



vicinity, thought themselves owners of the washings, they were obliged to work during the day with great precaution, retiring at night in their canoes to a distant place. Their watchfulness and industry were magnificently rewarded, as they were enabled to anticipate a continued remuneration. Uniting again a short time afterwards, nothing having transpired during the interval, and wishing to proceed with greater speed, they remained at the workings, and during the night were surprised and killed by the savages. Latterly there are some individuals who go by night in their canoes to the Santiago washings, stealthily collect as much sand as fills their boats, and carry it away to their homes, by these means obtaining large quantities of gold.

"It is said that the Patohuachanu is richer still, that it rivals California, and that by the eye one can distinguish the sands to be auriferous. It is not known precisely where the place is, but it is south of the Marañon. The Aguarunas know it. It is to be found very near the spot where the Society is making the road to Cahuapanas.

HOW TO DEVELOP THE GOLD WASHINGS.

"The extraction of gold in the workings in the river Santiago should be carried on in a proper manner. An establishment of fifty men should be formed, provided with good guns for sporting purposes, and small mountain guns for protection, with the necessary ammunition.¹ The pay should be twenty-five soles per month, in addition to their keep and passages; at which wages plenty of men can be found. It will be necessary to construct a fort for the habitation of the workers and others. The colony should contain 100 men, at least. Rigorous discipline and strict vigilance at night would be necessary, to keep themselves safe from the attacks of the savages, who would, when they found the undertaking was firmly

¹ Proper precautions against the Indians may only be necessary at this particular place, as Mr. Jean Nötzli, a mining engineer and scientist, assured the writer that he has frequently passed down the rivers in the neighbourhood of the Pongo of Manseriche without ever having been molested by the Indians. See his report, Chap. v.

established, abandon the neighbourhood. The machines employed for extracting the gold should be the same as are used in the United States.¹ Above all, it is most important and indispensable to have a properly-constructed steamer, to transport men and goods, and convey things required.

"On the hills of Angaisa and the Patohuachanu, gold workings are unknown at present, but it is worth while to seek for them. It would be most advantageous to employ capital in erecting mills, using the motive power of the rivers."

PROPOSED CONSTRUCTION OF A RAILWAY TO CAHUAPANAS.

"We will now direct attention to the advantageous uses to which foreign capital may be employed in the Amazon regions. One of the most important is the construction of a railway between Cahuapanas and Yonan, the present termination of the railway from Pacasmayo. The distance is not more than 333 miles, and when this work is completed, important communication between the Atlantic and Pacific will be established by way of the Amazon, the Cahuapanas river, and the railway. The rails should be disembarked at Cahuapanas, and laid on sleepers of good timber, of which there is a great abundance, sufficient to construct all the railroads in South America. The railway would pass through the capital of the Amazon provinces and Cajamarca, and all the towns would be interested to find labourers and provisions. A Steam Navigation Company should be established, and distributed so as to make the navigation of the principal rivers, which would greatly assist colonisation. It is natural that the traffic would be small at first, but the Company should take upon itself the gathering of produce on their own account, such as coca, &c., which is readily found along the banks of the rivers, and barter for gold with the Indians. A few steam-launches would aid in the development of these regions."

¹ In New Zealand steam dredgers are used for obtaining the gold-dust from the rivers, and return a large profit to their owners. These machines are made in England, and would be very suitable for these rivers; with these an immense return would be realised.

DISTANCE FROM ONE EXTREMITY OF THE COUNTRY TO THE
OTHER, BY WAY OF CAHUAPANAS (FROM N.E. TO S.W. IN
THE NORTHERN PART OF PERU).

From Loreto	to	Pebas	distance 131 miles.
„ Pebas	„	Iquitos	„ 110 „
„ Iquitos	„	Nauta.....	„ 40 „
„ Nauta to the mouth of the		Huallaga ...	„ 208 „
„ Huallaga	„	Cahuapanas.	„ 78 „
„ The outside to the town of		Cahuapanas.	„ 66 „
„ Cahuapanas	to	Chisquilla ...	„ 72 „
„ Chisquilla	„	Chachapoyas	„ 45 „
„ Chachapoyas	„	Cajamarca...	„ 130 „
„ Cajamarca	„	Yonan	„ 66 „
„ Yonan	„	Pacasmayo ..	„ 39 „
Total			„ 1,039 „

“From the mouth of the Cahuapanas to the commencement of the Pongo of Manseriche, the furthest point of navigation on the Marañon, is 83 English miles. The communication afforded by the road to Cahuapanas, and the establishment of communication between the two towns of Iquitos and Chachapoyas, would be of immense advantage to both; the former would obtain a market for its abundant agricultural produce, whilst the latter would benefit by cheap fresh provisions. Iquitos would be developed rapidly, and become a town of great importance on the Amazon. We learn that, in August last, an expedition started from Iquitos *via* Cahuapanas, coming in the direction of our last two expeditions, to seek the track which the Society made; and on the 9th of September an expedition started from Chachapoyas to meet the former.”

CHAPTER III.

Products of the Montaña.

THE FRUITS OF THE MONTAÑA.

PROFESSOR ORTON¹ says:—"The valley of the Amazon, so remarkable for the abundance and variety of its woods, is equally rich in other products of the vegetable kingdom. The field is so vast that it can hardly be said to have been explored; but enough has been seen to justify the remark that, if the valley is not the 'Ophir of Solomon,' as some suppose, it is certainly worthy of the name. The industrial, medicinal, and food plants already known and used are beyond enumeration; but, when science and commerce shall have threaded every part of the forest, an immense harvest will be reaped."

Sapoty (*Achras sapota*) or *sapotilla*—a very sweet fruit of the size of an egg, with a yellowish-brown exterior—is most abundant in the eastern valleys of Peru.

Caju (*Anacardium occidentale*) is the fruit of a terebinth abounding in dry, sandy soils, from Santarem to Moyobamba. It has the shape and size of an ordinary pear, with a kidney-shaped nut at the lower end. An excellent wine, considered anti-syphilitic, is made from the fruit, and the nuts are roasted and eaten.

Abacate (*Persea gratissima*), or alligator pear, called "palta" on the Andes. This delicious fruit is the product of a tall laurel-tree with dome-shaped top, grown on all the Amazons, but particularly on the Marañon. The unctuous pulp already recommends itself to a refined taste by its wonderful delicate flavour.

Guava, or *goiaba*, resembles a small pomegranate, and is used for making an excellent though astringent jelly.

¹ Much of the description of the flora in the present chapter is derived from that given by this eminent traveller.

The tree, a scrubby *Psidium*, grows sparingly throughout the valley, and is seen at Moyobamba.

Oranges, or *maranjas*, abound the whole length of the river; those of Moyobamba probably have no equal. The trees blossom all the year round, but especially in January.

Pupunha (*Guilielma speciosa*), or peach palm, on the Peruvian slope called "pisho-guayo," or bird-fruit. This celebrated fruit has the colour and size of a peach. Bates compares it to a mixture of chestnuts and cheese, and Spruce to something between potato and chestnut, but superior to either. It is very nutritious, and forms the principal article of food of the natives, when in season. It is not indigenous, and does not appear wild, but has been cultivated by the Indians, like the cocoa-nut, mandioca, and banana, from time immemorial.

Pitajaya.—The delicious fruit of a tall cactus, found chiefly at Cajamarca.

Palmeo—the terminal bud of many palms—is largely used, particularly on the Marañon, as a salad.

Bread-fruit (*Artocarpus incisa*) has been introduced, and is cultivated sparingly from Pará to the Andes.

Rice is cultivated at Moyobamba.

Coffee has been introduced on the Amazons, and a very excellent quality has been raised on the Rio Negro.

Cacao is a native, and thrives with little culture. Except rubber, it is the chief article of export. Bates saw trees yielding an arroba (25 lb.) each a year. The fruit, in the hands of the natives, is turned to good account, yielding, besides chocolate, a vinegar, a soap, a wine, and a dulce.

Mandioca, or *cassava*, the bread-root of the Amazons, yields farina and tapioca, and a liquor called "tucupi," or "aguardiente de beyu." There are four species:—(1.) The mandioca proper (*Maniotot utilissima*), of which there are many varieties, among them maicurú—the lowest being only four feet high, but producing the largest and best fruits—itoqui, tambaqui, auirana, and mucura. (2.) Aypi (*M. aipi*) or sweet mandioca, called "yuca dulce" on the Marañon, having oblong, juicy roots, becoming sweet after they are gathered. The chicha made from it is called "mossato." (3.) Macachero, or macasheiro (yuca of

Peru?), whose roots are used as potatoes roasted or boiled. 4. Manicueira, different from aypi, having a long root. Mandioca will produce in six months after planting, without cultivation. The root is deprived of its poisonous juice in a curious strainer. A long tube of woven fibre, containing the macerated root, is hung up, with a stone at the lower end, by which means the diameter is diminished and the juice squeezed out. In the mandioca, or cassava plant, the wants of man and beast are supplied. Life and death are blended in the plant: every part of it is useful. The cattle eat the leaves and stalks, while the roots are ground into pulp, which, when pressed and baked, forms farina—the bread of all classes. The juice is deadly poison.

Sugar-cane, or sorghum, has a luxuriant growth everywhere on the Amazon, but the cane seems better fitted to make rum than sugar. At San Regis and on the Marañon 18,000 gallons of cashaça are manufactured yearly. Sugar is imported.

Canela (American cinnamon) is obtained from the forests round the head-waters of the Pastassa and Napo, and at Cashaboya, on the Ucayali. It is said to contain more essential oil than that of Ceylon, and it is used as a condiment in the Quito valley.

Vanilla, or *vanilla*, is not cultivated, as far as we know, except by an American at Napo; but a small quantity, collected wild, goes down to Para. It is quite abundant on the Sacramento plain of the Ucayali. It is inferior to the Mexican, but would be improved by culture.

TREES OF THE MONTAÑA.

Nowhere in the world is there found such a variety of useful and ornamental woods as in the virgin forests of the Marañon;¹ amongst which are palms, cedars, mahogany, rosewood, satinwood, and many other varieties of valuable cabinet woods. On the high lands, fuchsias, rhododendrons,

¹ Prescott says:—"Here it is that Pizarro's men beheld stupendous trees; some were so large that sixteen men could hardly encompass them with extended arms. Thus, allowing six feet for the spread of each man's arms, they would be about ninety-six feet in circumference, or thirty-two feet in diameter."

calceolarias, and like plants flourish as in the temperate zone. The *Caucho*, or india-rubber tree, is one of the most valuable trees known for commerce. There are two species of the caucho-tree, which are worked under different systems. They are the *seringa*, or *borracha*, which comes from the *Hevea guianensis*, and the *caucho*, called in the Indian dialect *cahucho*. The trunk of this tree is less in height than that of jebi, which does not exceed fourteen mètres (forty-six feet) in the Peruvian forests. Its oval leaves, hairy on the reverse side, fall in the month of July, and are recovered again in the month of August, the period in which its sap is most abundant. The sap is obtained in the following manner¹:—An incision is made at the foot of the tree in the form of a V. The white sap flows in globules from the cutting, and is received in india-rubber bags. When the lower part of the trunk is drawn off, the tree is cut, and new incisions made the whole of its length. The milk, or sap, falls into a hole opened in the ground. To accelerate the coagulation they add to it the juice, diluted with water, of a plant known in Peru under the name of *leche-camole*. An india-rubber plant will yield one arroba (25 lb.). The india-rubber gatherers say that it is impossible to extract the caucho without losing the life of the tree. If not felled it is attacked immediately in the part cut by insects, and soon dies. In working the *Hevea guianensis*, which grows to the height of fifteen to twenty mètres (forty-nine to sixty-six feet), the tree is not killed. It grows in families or groups, and often 100 trees can be found growing at short distances apart in what is called a *seringal*. The seringero, or india-rubber gatherer, establishes his residence in the neighbourhood, and makes pathways between the trees. He goes every morning to puncture the trees, that is to say, to make at the height of the hand small incisions, and fixes beneath them a globe or vessel to receive the milky juice. The coagulation of the india-rubber is obtained by exposing the liquid to the smoke produced from the burning of the fruit of a palm. The tapping of a seringal is renewed daily for four or five months, the supply is increased up to the end of the third

¹ Translated from the report of M. Olivier Ordinaire to the Geographical Society of Paris.—From *El Comercio*, Lima, April 22, 1887.

month. The trees are then allowed one month's rest, and the working of the groups can last for twenty years. At the most productive period 100 trees can give one arroba (25 lb.) of india-rubber per day.

Acapu, the "Wacapou" or "Black-heart" of foreigners. It is the *Andira aubletii*, one of the *Leguminosæ*. This is the most valuable ship timber in Amazonia, resisting the teredo. Inland it is largely used as uprights in construction. There are two kinds—that of the terra firma (the best) and that of the lowlands. The wood is heavy, hard, and of a light brown colour, sometimes mottled brown and white. It has a lofty naked trunk, yielding clear timber 60 feet long. *Acapu* is the pride of the Brazilians, being invaluable in the naval art, and admirably fitted for piles and railroad ties, as it endures moisture and is tough. The leaves are alternate. It grows the whole length of the river Amazon and also on the Huallaga.

Itaiüba or *Icaüba*, the "Stone-wood" of the Amazon, belonging to the laurels, is one of the most valuable and common woods in the valley. It is hard, heavy, and firm, and is largely used for building schooners and for houses. As ship-timber it is as durable as teak. It often occurs four feet in diameter and from 30 to 60 feet high. There are two kinds, yellow and black. The former, *I. amarella*, resembles maple; the other, *I. pretu*, is very hard, dark-coloured, and close-grained. Both grow from the Tapagos to the Huallaga.

Palo de Cruz or "Wood of the Cross," the *Lignum vitae* of Brazil. It is a comparatively small tree (*Leguminosæ*), not over two feet in diameter, consisting of a white wood enclosing a black and intensely hard heart, and from the fancied cruciform section it sometimes presents it derives its name. It is susceptible of a fine polish, and is chiefly made into canes; it is almost confined to Pebas on the Marañon.

Palo de Sangre or "Blood-wood."—This is a very beautiful wood of a red colour, fine-grained, hard, and receiving a good polish. The tree, which has a white bark, grows only on the Marañon and its tributaries, particularly near the foot of the Andes.

Palo Setin or "Satin-wood."—This precious wood is very close-grained, heavy, and durable, of a deep yellow

colour, and is used for veneering, inlaying, picture frames, &c. It has more lustre than the oriental satin-wood (*Chloroxylon*), and belongs to an entirely different order—the *Ebenaceæ*. Logs can be secured 8 inches square and 10 feet long. It grows in Peru.

Palo-mulatto, called *Capirona* on the Marañon, is allied to the cinchonas (*Eulkylistia spruceana*) and grows far up the Andean tributaries to the altitude of 2,000 feet. It is a tall, elegant tree (from 80 to 100 feet high), conspicuous for its polished bark and green trunk. The wood is light and tough, and used for beams in houses; but from the abundance and the readiness with which it burns while green, it supplies most of the fuel consumed by the Amazon steamers.

Jutahy or *Jetaby*, "Copal-wood."—This is also a patriarch of the forest, from 150 to 180 feet high, with a gigantic trunk, sometimes 60 feet in circumference and supported by huge buttresses. Generally, however, the trunk is 40 feet long and 3 to 4 feet in diameter. The bark resembles the English oak. The high yields copal, and the low a poisonous juice. The wood is dark-coloured and intensely hard, tough, and dense. It is used for rollers and cogs in sugar-mills, for beams and planks in heavy engine work, and for treenails in planking vessels. It occurs throughout the valley.

Maçaranduba or "Cow-tree."—This wonderful tree, one of the largest of the forest monarchs, is the *Mimusops elatu*, belonging, therefore, to the same order and genus as the *Moirapiranga*. It stands from 180 to 200 feet high and 20 feet in circumference, crowned with a vast dome of foliage. It has entire alternate leaves, a deeply-scarred, reddish, ragged bark (used for dying cloth), palatable fruit and milk. The milk has the consistency of cream, and may be used for tea, coffee and custards. It is a hard, fine-grained, heavy, reddish wood, very durable in water—more so than itaüba even—and the toughest of all Amazonian woods, yet splitting easily. It is largely used for construction and for furniture, and would be admirable for ship-building. It grows on lowlands along the whole length of the great river, from Para to the Upper Marañon, also on the Rio Negro, and probably other affluents.

Chonta is a general term in Quichua for palm. The one

referred to here is the *Bactris ciliata*, a very hard, dark-coloured, elastic wood of the Marañon, from which the Indians make bows and spears and the points of arrows. Another chonta (a species of *Euterpe*) is used in construction on the Huallaga. The wood of the Pupunha Palm is tough and black, taking a fine polish, and is called "Chontadura" on the Upper Marañon.

Aguano, or mahogany.—This is a gigantic tree even for the tropical forest. It is probably not identical with the (*Swietenia mahogoni*) of Central America, the mahogany of commerce, but it resembles it in colour, and it is a choice wood in the Montaña. It grows on the western tributaries of the Marañon, as the Napo and the Huallaga, where it is used in canoe-building, &c.

Cocobólo.—An excellent timber of Moyobamba, the heart of a very large tree. It is reddish and very strong—often used for making the cogs of wheels. It is very heavy and never floats in the water, and is most useful where strength is required.

Cumatsiba.—A very hard, heavy, reddish wood, with a white bark, from the Ucayali.

Aléso (*Betula acuminata*) is one of the most abundant and useful trees in the Quitonian Andes, descending the Pastassa to nearly 4,000 feet.

Labuana.—One of the largest trees on the Huallaga, has a grey bark and umbrella-like top. The wood is used for building, and rails of it are taken down the Marañon on steamers.

Chawinto and *Sangre de Drago* are very tough woods, growing round the district of Moyobamba.

Balsa, or *ceibo*.—An exceedingly light wood, the "Raft-wood" of the Upper Marañon. It resembles the cotton-wood. The tree (*Ochroma piscatoria*) is about as large as the maple, and the fruit has a cotton-like covering used for mattresses.

DRUGS, DYES, GUMS, AND TEXTILE PLANTS OF THE MONTAÑA.

Drugs.

The valley of the Amazons is an infinite field for the discovery of useful vegetable products. Many unknown principles are waiting to enter our *Materia Medica*, or to advance the industrial sciences. Many a herb of mysterious nature is known only to the Indians.



A CINCIONA FOREST.

Fire page 32.



Cinchona, or Peruvian bark.—What an immense benefit Peru has conferred on the world in this valuable drug! What an amount of suffering has been relieved by its use! This, the foremost of febrifuges, is collected at the sources of the Upper Marañon, Huallaga, Ucayali, and Beni. The region extends over 29° of latitude, and describes a vast curve commencing with the 19th parallel south, and continuing generally along the east slope, at an altitude of 7,500 feet. The valuable red bark (*C. succirubra*) is peculiar to the Pacific side of Chimborazo, and, therefore, does not belong to the Amazon valley. The crown bark (*C. condaminea*) is found in the provinces of Loja, Jaen, and Cajamarca. Its proper commercial name is "Cascarilla," but that name is now given to cinchona in general. The yellow bark (*C. calisaya*) from Bolivia is the present chief source of quinine. The Indians call it *Quina-Quina*, or "bark of barks."

The cinchona trees have the aspect of the beech, with the flowing branches of the lilac, smooth bark, white wood, susceptible of a high polish; opposite, entire leaves, similar to those of the coffee plant, which belongs to the same order. The reckless manner of gathering the bark will, ere long, remove all traces of cinchona vegetation. At least 3,000,000 lb. are shipped annually to England, and the demand and price are on the increase. Several substitutes are used by the natives, as *Maravilla*, from the Pastassa forest; *Chuquiraga*, from the high Andes of Equador; *Quina* (*Solanum pseudoquina*), and *Cafferana*. A tincture of the last is considered more efficacious than quinine.

Mr. J. B. Minchin, the English traveller to the eastern slopes of the Andes, says:—"The cinchona plantations in Peru and Bolivia are at a height above the sea of from 1,300 to 6,000 feet, and are formed to some extent of young plants from the forests, but chiefly from seed, the small plants being transplanted when from three to four inches high to the bottom of holes some six feet apart and six inches square by a foot deep, the mouth of the hole being partially covered with a piece of bark. The young plant is thus protected till it reaches the surface-level, when the bark is thrown off, and it is able to bear the force of the

sun. A year and a half from the time of the seed being sown the plant attains a height of from six to seven feet, and, at the age of six years, the trees are cut, each one yielding some five pounds of dry bark. The cost of forming a plantation of upwards of 50,000 plants a year old may be calculated at the rate of 2½d. per plant. The bark grown on the steepest slopes appears to be the finest, and the immediate proximity of the high cordillera is evidently advantageous, probably owing to the greater amount of moisture in the air, and the more clouded atmosphere and frequent showers, as, at equal elevations further east, the quality is much inferior."

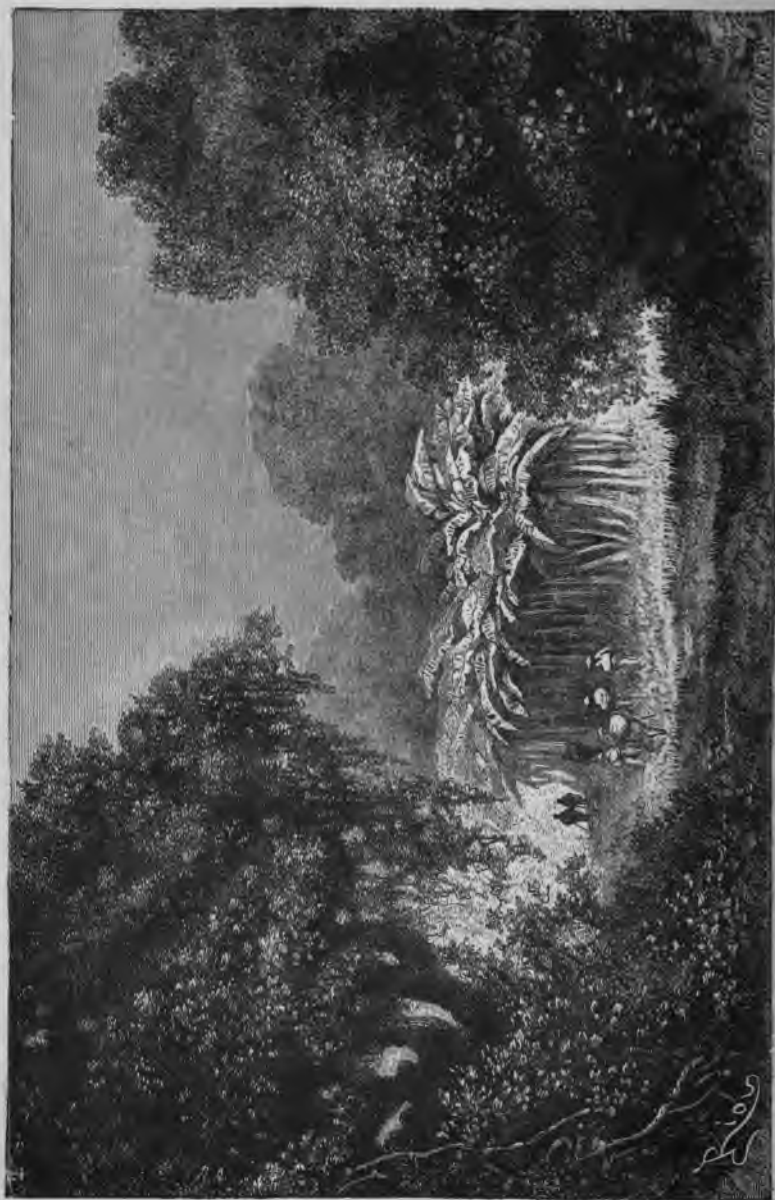
Sarsaparilla is found on all the tributaries of the Marañón. It is the root of a prickly climbing plant, found chiefly on dry, rocky ground.

Ipecacuanha, the great emetic, is the creeping root of the herb *Cephaelis*, growing in the humid, shady forests of the Amazons. It is usually gathered while in flower, *i.e.*, during the rainy season. *Ionidium poaya* is sometimes sold for the genuine ipecacuanha.

Gomphrena ("paratodo" of the natives), growing on the Madeira, is used as a panacea for intermittent fevers, colic, diarrhoea, snake-bites, &c.

Guaraná (*Paullinia cupania*), *Poaya branca* (*Ionidium otuba*), *Sphæralcea cisplatina*, *Manettia cordifolia*, *Pavonia diuretica*, and the seeds of the *Patagua* (*Hura aculota*), are popular remedies for bowel complaints. The guaraná, the most important, is cultivated on the Negro and Tapajos, but especially on the river Manhes. It is a natural twiner, but is kept down by cultivation to the size of a compact currant-bush. The seeds are roasted, ground, and made up into sticks. The essential principle is almost identical with theine and caffeine. It is a preventative rather than a cure, but European physicians pronounce it efficacious not only in diarrhoea but also in sick-headache, neuralgia, paralysis, and lumbago. In France it has cured attacks of cholera when the evacuations were at the rate of thirty per hour. It also prevents exhaustion, hunger, and sleep, being slightly exhilarative. The natives, particularly up the southern tributaries, are passionately fond of guaraná, and drink it as a beverage. On the Orinoco it is used as a





preventative against bilious fevers. In Bolivia it brings six dollars a pound, on the Amazons sixty cents.

Matioco, the leaves of *Arlanthe elongata*, growing on the Peruvian slope, is a valuable styptic for hæmorrhages. A species of leguminous *Myrospermum* ("Quino-quino") growing in the high region of the Huallaga yields the Balsam of Peru.

Coca ("Ipadu" of the Brazilians), the powdered leaves of an *Eurythroxylon* growing on the eastern slopes of the Peruvian Andes, is, to the natives of that region, what opium is to the Turks and betel to the Malays. It is not only a powerful stimulant, but also an alimental and a tonic. The leaves resemble tea-leaves, only they are entire, and the plant is a slender shrub, occurring both wild and cultivated. With it and a little parched corn the Indians will stand a surprising amount of fatigue,—in fact, with coca alone they will go days without food or sleep. The best coca is grown in the Yungas of Bolivia. (See a fuller description of coca and cocaine, page 110.)

Tobacco of fine quality is cultivated in many parts of the Amazons. The best quality for pipes is that of Borba and Trinidad on the Madeira. The finest for cigarettes is produced at Jeberos, near the mouth of the Huallaga, and at Baguá, Tamboli, Duña, and Cunchára, in the valley of Utcubamba. Three species of the tobacco-plant are recognised by Brazilian botanists, *Nicotiana tabacum*, *N. rustica*, and *N. persica*.

Aya huasca, or "Dead man's vine" (*Banisteria coapi*), a woody twiner, cultivated on the upper parts of the Pastassa, Napo, and Negro, contains in its stem one of the most remarkable narcotics in America. The Napos and Uaiüpes drink an infusion at the feasts to get into a trance.

The celebrated poison *Curari*, the most powerful sedative in nature, is a compound prepared only by the natives living beyond the cataracts of the northern tributaries, especially the Negro and Japurá, and by the Tecunas. Its principal ingredient is derived from the *Strychnos toxifera*. The extract is prepared by boiling the bark, and then coagulating with the milk of another plant and tobacco-juice. The slightest portion of this poison diffused in the

blood produces excessive torpor, but it is said that the mind and involuntary muscles continue active. Death ensues from palsy of the lungs. Salt is the only known antidote, and its effects on salt-eating men are not so manifest as on wild animals. It is sold chiefly at Pebas, at one dollar fifty cents a cup of half a gill. Tipped with curari, the needle-like arrow used in the blow-tubes will kill an ox in twenty minutes and a monkey in ten.

DYES OF THE MONTAÑA.

Achiote, *anotto*, or *urucú*, prepared from the seeds of the *Bixa orellana*, growing abundantly on the high Marañon, is used extensively by the Indians in dyeing a reddish-brown or orange-yellow.

Indigo (*pseudo-anil*) grows wild in many places, as at Santarem, Foente-Boa, and in the provinces of Loreto, Urubamba, and Carabaya.

The fruit of the *Jagua* or *Vitu* (*Genipa*) gives a dark-blue, as on the Ucayali and Huallaga. The Moyobambians dye cotton-cloth a permanent blue by simply boiling it only with the digitate leaves of the *Yangua tinctoria*.

Lasiandra argentia, on the Amazons, and *parinari*, *rijari*, and *huito* from the Marañon, are used for dyeing black.

Orchella, valuable for a yellow dye, is grown along the coast.

GUMS AND OILS.

Copal exudes from the bark of the *Hymenæa* (*jutahi*, of which there are several species), a monarch of the forest often 100 feet high. On the Marañon it is used for illumination.

The *Cetico* (a *Cecropia*, a tree 50 feet high, with white bark and digitate foliage, very common on the Marañon) is also a "wax tree," but the wax is of animal origin, stored away in the hollow trunk. The wax is of two kinds, white and reddish, the former is said to be made by bees and the other by ants.

India-rubber—called on the river *borracha* (from the form in which it is exported), *seringa* (because it was formerly made by the natives into syringes for injections, a popular treatment of disease), *gomma-elastica*, *jebé*, and *caucho*—is the product of several Amazonian trees, but especially of *Syphonia cahucha*, known by the collectors as *Seringueria*, or *Chilinga*. This tree, having the bark and foliage of the European ash, and a trunk with the maximum diameter of four feet, and branchless for a hundred feet, grows wild on the lowlands (ygapos) of all the tributaries, but it is tapped mainly in the regions of the Madeira, Xingú, Puruó, Jurúa, and Tapajos. The rubber is collected in the dry season (between July and January), one man collecting on an average 8 lb. a day, worth on the Amazons (when fine) 14 dollars an arroba.¹ The sap has at first the consistency of cream, but soon thickens and is further hardened by being exposed to the smoke of burning palm-nuts, usually the urucuri. Coagulation is necessary also to prevent the separation of resinous parts. (See mode of collection, page 28.)

Castor-oil plant (*Recina*) abounds along the eastern slope of the Andes, one species attaining, at Tarapota, the height of 25 feet, but very little oil is extracted.

Sassafras, so-called, is the transparent oil of a tree on the Upper Negro, and is used in mixing colours.

TEXTILE PLANTS.

Pita (so-called in Ecuador, in Peru "caybua") is made from the macerated fibrous leaves of a species of *Agave*. It is manufactured most largely at Archidona, on the Napo.

The *Chambira* (an *Astrocaryum*) is used by the Zaporos on the Napo for string for the manufacture of hammocks.

The natives make a bark cloth from the tururi (*Curati legalis*) called "cascara" up the Madeira, and from the lanchama on the Marañon (Napo and Huallaga).

A wax palm (*Carnabua*) furnishes a fibre for making mats; and ropes and other fabrics are made of the fine, glossy fibre called "caraua" and "palhá," from a species of *Bromelia*.

¹ One arroba equals 25lb. Spanish.

The *Screw pine* (*Carludovica bombonaje*), the unexpanded leaves of which are so extensively used at Moyobamba as well as at Guayaquil for the manufacture of Panama hats, is grown between the Huallaga and the Andes, particularly about Moyobamba, Rioja, and Tarapoto. The tree is seven feet high, but the full-grown leaves are ten or more. The longest straw obtainable is $27\frac{1}{2}$ inches. It takes about sixteen bundles (cogollos) for an ordinary hat, and twenty-four for the finest. The straws of the latter are not more than one-fortieth of an inch wide. About 100,000 hats were annually sent down to Pará ten years ago. They then commanded 40 dollars a dozen; now they can be bought for 15 dollars.

Cotton is grown mainly on the Huallaga (particularly at Tarapoto) and Ucayali. Trees at Balso Puerto grow twelve feet high. The native cloth is called "tocuyo" and "lienza," and that which is made into *cushmas*, or long tunics, is stronger than the stoutest unbleached cotton of England or the United States. The spinning-wheels and looms are of the rudest construction.

Huinba, the produce of a tree (*Bombax*) growing on the Peruvian slope, resembles cotton, but is much lighter and very silky. The Indians use it to wrap around the slender arrows blown through the cerbanta (blow-tube).

Samaína-silk, from the giant *Eriodendron*, is used for the same purpose.

PALMS.

Mauritia.—This group may be distinguished from all others, not only by their leaves but also by their scaly fruits and pinnately branched spadices. There are at least a dozen species on the river. The *M. flexuosa*, the miriti of Brazilians, and achuál or aguáshi of Peruvians, is the most universally distributed palm in the valley, abounding from the shores of the Atlantic to the altitude of 3,000 feet on the Andes of Peru, Ecuador, and New Granada. It is a social palm, forming groves along the low shores at the mouths of the tributaries and about swampy lakes. It is always a conspicuous object, the smooth stem often rising 100 feet and bearing enormous, spreading, fan-like leaves, and clusters of egg-shaped, scaly, reddish fruit resembling

pine-cones. The epidermis of the leaves furnishes a useful fibre. The orange pulp of the fruit is eaten by the Indians, or made into wine called yucuta, and the farinaceous pith yields a kind of sago. The Indians call it "the tree of life."

Carludovica palmata (R. et P.), or bombonáje, from which straw hats are made, has no stem; the leaves, on long slender petioles, spring from the ground. The leaves are about 10 feet long, fan-shaped and four-parted, each segment on its own rib; there are eighty layers in a young leaf. It is this young unexpanded leaf, which is split into 160 or more strips, that is used in the manufacture of Panama hats. It is confined to the Andes.

Phytelphas.—The ivory palms, whose seeds yield the vegetable ivory of commerce, are found only at the roots of the Andes, generally in clusters near streams under the shade of lofty trees, as at Tarapoto. Their extreme altitude is 3,000 feet. There are two species; *P. macrocarpa* (R. et P.), or polo-ponto, has a very short trunk or none at all, and large pinnate leaves, with about 100 pairs of pinnæ, which begin at the very base of the leaf. The fruit is about the size of a man's head, and is well packed with from twelve to twenty leaves.

ORCHIDS.

Some orchids are in bloom all the year round. The finest species is the *Odontoglossum*, having large chocolate-coloured petals variegated with yellow. "Such in number and variety," wrote Humboldt, "that the entire life of a painter would be too short to delineate all the magnificent *Orchidæ* which adorn the recesses of the deep valleys of the Peruvian Andes."

CHAPTER IV.

The Rivers, Indian Tribes, and Vocabularies.

NAVIGATION OF THE AFFLUENTS OF THE MARAÑON.

Report of SEÑOR A. LARREA, Commander of the Peruvian Naval Station; dated Iquitos, March 31st, 1885. Translated from the Peruano.

THE *Huallaga*¹ is navigable as far as the cataract of Aranboso, which is 191 miles from its mouth. At the present time canoes can reach up to the centre of the Huanuco department, and steamers of 800 tons trade as far as Yurimaguas. For the first hundred miles it has an average depth of three fathoms, and a current of three miles an hour.

The *Paranapura*, affluent of the former, is navigable as far as Baradero, the point where it unites with the Cachiyaco. The distance is almost forty miles. The *Aipena*, like the former affluent of the Huallaga, is navigable as far as Naranja-Tambo, and can be navigated 120 miles. By this river the old town of Jeveros is reached.

The *Marañon* has 179 miles navigable, from its confluence with the Huallaga up to the Manserich cataracts. The steamers *Morona* and *Pastaza*, which belonged to Peru, could always reach as far as Borja, a port 1½ miles distant from the said cataract.

The river *Santiago*, called by the Indians *Canusayacu*, the mouth of which is on the Manserich cataract, although it has not yet been navigated on account of that dangerous pass, is not as yet proved to be impassable. Canoes ascend it, and not a little gold, washed from its banks, is brought down by traders; all the alluvial slopes along this river to the source of the Napo are auriferous. The small steamer *Napo* endeavoured to pass it, but was

¹ This river rises in the silver-bearing mountains around Cerro de Pasco, and after a course of 500 miles falls into the Amazon.

prevented by the severe current and had to return, but this steamer is very far from being a model boat for expeditions of that magnitude.

The river *Potro*, an affluent on the left bank of the Marañon, has been navigated for forty miles by the launch *Mayro*, when it was the property of the State. The river is important, as being the proper avenue for the commerce of Chachapoyas. It is 1,000 mètres wide at its mouth.

The *Cahuapanas*, affluent of the Marañon, is navigable for 120 miles, at which point is situated the small village of Barranguela, and the canoes navigate it with facility from beyond the village of Cahuapanas. The launch *San Antonio*, belonging to Linares & Co., carries on a trade along this river, where there are inhabited places.

The *Morona* has its origin in Ecuador, and joins the Marañon a little below the Pongo of Manseriche. Its banks are much populated by savages, but there does not exist any reason to fear them, like those on the Santiago. The *Morona* has been navigated by the Government for the express purpose of ascertaining this fact.

The *Mangosisa*, a tributary on the left bank of the *Morona*, has been navigated as far as the centre of the district held by the tribes of Indians (Patucas and Ayulis). The *Morona* and its affluents can be navigated even further by steamer. The distance from the mouth to the confluence of the *Mangosisa* and *Cusulima* is 310 miles, and steamers ascend the latter as far as Macas, the golden Seville of old Spanish days.

The river *Pastaza* has likewise been visited by Government ships, and at the present time is traversed by the house of Linares & Co., who have several establishments there. They employ the steamer *San Antonio*, which reaches near to Andoas, and the smaller vessels pass up to Sarayacu, in the hills of Bombonasa, near Canelos. A considerable amount of gold is washed by the natives from the black sand of Bombonasa.

The river *Tigre*, affluent on the left bank of the Marañon, has been navigated by the *Mayro* once, and the *Loreto*, belonging to private owners, has made several journeys to the villages to reconnoitre. The first took 150 days, and the second has taken eight days in voyage.

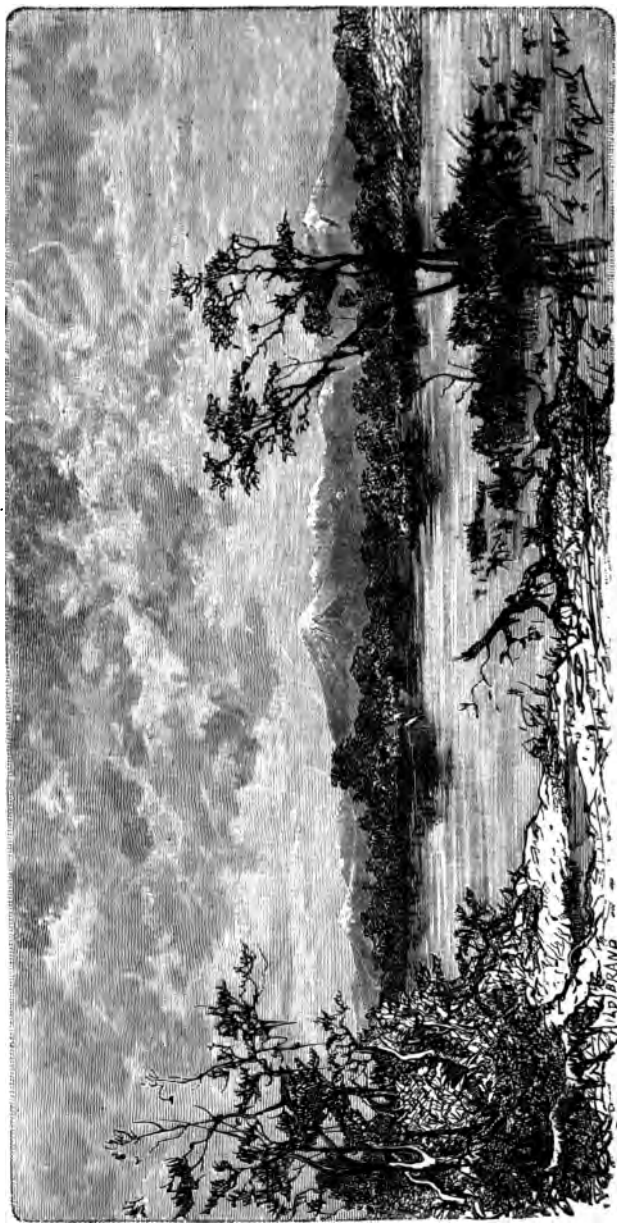
A course of 150 miles can be reckoned upon on this river. The owners of the *Loreto* know it. They have had an establishment at the mouth of the said river for twenty years. They can navigate for two months above in canoes. The produce is rubber, sarsaparilla, copal, oil, coffee, wax, pitch, &c.

The *Nanay*, a river near Iquitos, can be navigated for two months in canoes, according to the accounts of the natives living on its banks. For 160 miles there is a depth of from three to four fathoms.

The *Napo* is navigated as far as it is found to be of utility to the owners of the launches. The steamer *Putumayo* has gone up this river oftener than any other vessel, reaching as far as Coca, at which point were found two branches of water, and at that point the captain learned that he could navigate as far again. From the Amazon to La Coca, the distance is about 200 miles. The Napo has two affluents navigable, but no scientific exploration of them has been made. The river is the natural highway eastwards to Equador. By decree of the Equadorian government, there is no duty on goods entering by the Napo for twenty years. Flat-bottomed steamers can reach Santa Rosa without any difficulty. It is a pity that commercial relations with the various tribes are not yet established, as a great profit could be made by trading on that important river. The town of Napo stands 1,450 feet above the level of the sea, and there are no mosquitoes there. There is a considerable amount of gold taken out of the Napo. It comes from the Llangunali mountains. Its length is about 800 miles. Above Santa Rosa the current runs six miles an hour, but at Santa Rosa only four miles. The Indians spend their time in feasting and hunting; agriculture is unknown; they have no word for plough; they have a great weakness for beads.

The *Curaray* (meaning gold), one of the principal tributaries of the Napo, rises in the Llangunali mountains. Should the Curaray be found navigable, it would open up one of the richest districts of the continent, abounding in vegetable produce, while the purest gold washed on the whole Amazon is obtained there.

The river *Yapurá*, or *Caquetá*, has been surveyed up to the Apaporis by the Hydrographical Commission, but it



THE NAPO, WITH A VIEW OF THE LLANGUNALI MOUNTAINS IN THE DISTANCE.

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did not proceed beyond the junction of that river. It is navigable ten days by steamer, or forty by six-oared canoe. The channel is only six or eight mètres (20 to 26 feet) deep, and there is no settlement.

The river *Yavari* was navigated by the steam launches belonging to the Peruvian Brazilian Boundary Commission, but it did not proceed beyond the meeting of the Yavari, Shino, and Jaquirana. At the present time this river is much frequented up to a place named Colombia, fifty miles below the junction indicated. This river serves the boundary line between Peru and Brazil. It is navigable for 900 miles.

The *Ucayali* is the principal tributary of the river Amazon. There is regular steam navigation along its course for deep-draught steamers, as far as the junction of the Pachitea, which is 575 miles distant from its mouth. One of its tributaries, the Cachujaco (which signifies salt), has salt water, derived from the mines at its source. In the Cuxhabaty there are rich deposits of gold. The Peruvian Government has constructed some roads through the dense forests connecting this river with the Huallaga. Trade is progressing rapidly. Churches, chapels, and schools have been built in the villages at the expense of the Government, and the natives are daily becoming civilised and industrious. The largest quantity of india-rubber is exported from this river.

The *Purus* has been explored for 1,866 miles. It can be navigated by large steamers as far as $7^{\circ} 4' 2''$ S. lat., from thence by steamers drawing 4 feet to the junction of the Aquiry. Since 1878 this beautiful and rich region has rapidly developed, a service of four Brazilian steamers has been established monthly, which carry no less than two million dollars' worth of india-rubber annually.

The *Yuruá* waters the regions between the Purus and Yavari. It is navigable for a distance of 1,130 miles.

The *Amaru-mayu*, a tributary of the Madeira, was explored, in 1860, by an expedition sent from Cuzco, under Colonel Maldonado, and in 1873 by another, under Colonel Latorre.

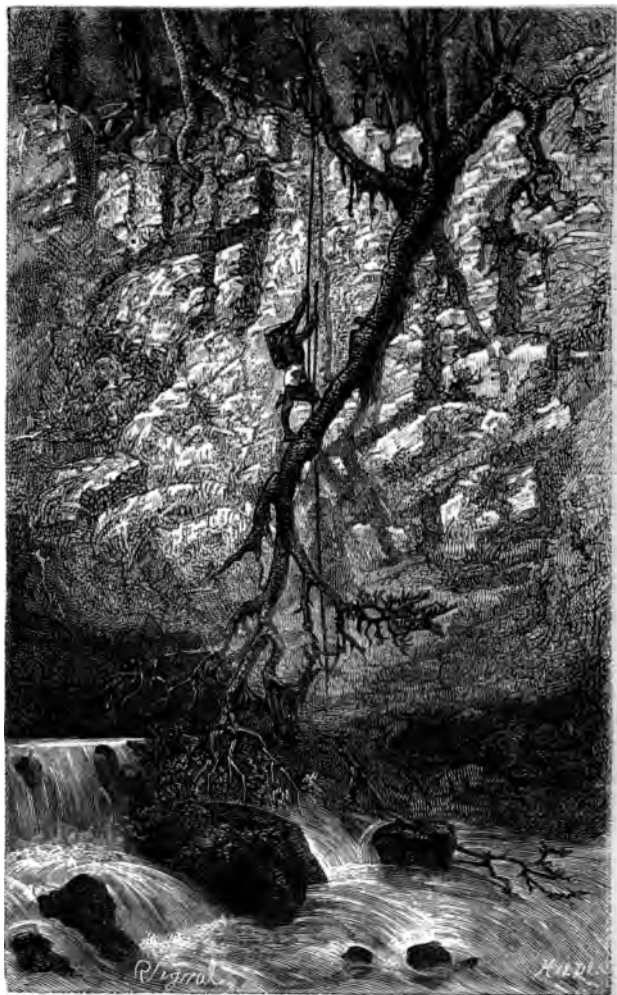
The *Beni*, also a tributary of the Madeira, was explored by Doctor Edwin R. Heath, in 1880 and 1881, since which time these regions have made great progress in

development, and now large quantities of india-rubber, vanilla, and other valuable products are gathered and shipped to Europe. Unfortunately the Beni is cut off from direct communication with the Amazon by the falls in the Madeira. A full report of the exploration of this river, the Amaru-mayu, and other tributaries, is contained in the June proceedings of the Royal Geographical Society of 1883.

In order to facilitate immigration to the Amazon regions, and afford the necessary facilities to the commerce of the world, the Peruvian Government, by decree dated 17th December, 1868, declared the navigation of the Peruvian rivers open to the flags of all nations.

EXPLORATION OF THE PUTUMAYO BY THE PERUVIAN- BRAZILIAN COMMISSION.

According to the account of the joint Peruvian-Brazilian Commission of 1873, the said Commission entered this river with steamers, and navigated it from the 12th to the 16th of July, 1873, showing that this river is navigable at least as far as that part of it which is situated in $2^{\circ} 46' 11''$ latitude, S., and $69^{\circ} 39' 10''$ longitude W. of Greenwich. In 1874 a private company of Columbians, named the Coqueta Company, formed an expedition for the purpose of exploring its natural products of india-rubber, sarsaparilla, and chinchona bark. In November, 1875, three steam-vessels were made ready—a steam launch, a cargo steamer, *Santa Cruz*, and the steamer *Tundama*. The steam launch was in command of a young Englishman named Mr. Alfred Simpson, and acted as vanguard to the expedition, in order to prepare firewood along the banks for the other steamers. In his account to the Royal Geographical Society of the voyage, Mr. Simpson says that the Putumayo is navigable for a steamer for a great distance. He calculated that the distance direct, from its origin near the Pasto volcano down to its junction with the Amazon near San Antonio, is 620 miles, but that, by the numerous turns in the river, it flows 1,200 miles. Adding to them the 1,800 miles from its mouth to the mouth of the Amazon would give a total of 3,000 miles as the distance from



AN IMPROVISED BRIDGE IN A GORGE NEAR NAPO.

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the origin of the Putumayo to the Atlantic. The river Putumayo, or Ica, takes its rise in the Eastern Andes of Equador, between $\frac{1}{2}^{\circ}$ and $1\frac{1}{2}^{\circ}$ north latitude, in the vicinity of the well-known volcano of Pasto. The Putumayo runs a general south-easterly course, almost parallel to the Yapura and Napo, over a bed of shingle and rocks, at the commencement of its course until near the Indian settlement Montépa, about 900 miles from its mouth, where the last stones are seen. It opens out into a great width at places, forming several channels divided by large islands. The principal tributaries on the right bank are the San Miguel, Incuisilla, Oqiuri, Campúyas Guayacurá, Yáhuas, and Utuhué; and on the left Cocaya, Totuilla, Grande, and Garaparaná, the last in the locality of Miranhás. Its mouth is very large, situated about twenty miles below Carapaná. Of these tributaries, the only one known besides the San Miguel, which runs within a day's foot-journey of the Upper Aguarico, are the Yahuas and Utuhué. Traders have passed the former occasionally; it is within one and a half days' journey on foot to Pebas. The latter serves as similar communication with Loreto. By treaty between Peru and Brazil the navigation of the Putumayo is common to both countries.

STEAM LAUNCHES REQUIRED FOR THE MARAÑON.

What is required for this department are two steam launches, from thirty-five to forty tons—one with a screw and the other built after the stern-wheel system, made appropriate for expeditions, and whose speed should be fifteen miles an hour. The hull should be after the model of the exploring ships *Napo* and *Putumayo*, should be constructed of steel plates, and have a draught of water of from three and a half to four feet maximum, with all its fuel of wood and provisions for victualling fifteen men. The hull should be divided into three sections—the first for seamen's quarters and naval stores, the second for machinery and fuel, and the after-part for provisions. A teak deck, with a small house on the poop; a wooden roof from stem to stern, seven feet high, on iron columns, with a gunwale three feet high, to serve to protect the crew from the arrows of

the natives and from gunshots, and should also be provided with engines of high and low pressure, horizontal boilers, and furnaces for green wood four feet long, and twin crews, for improved speed, would also be required.

THE PERUVIAN NAVAL FACTORY AT IQUITOS.

The naval factory which we possess at Iquitos is an important establishment, which renders very great service to the ten small steamers which navigate our rivers, and has my best attention. In December, 1877, it was delivered over to the contractors, and returned to the Government in June, 1883. In respect to the benefit which the factory lends, it is not the less important as serving as a school for young men, where they learn several useful duties.

EXPORTS FROM IQUITOS.

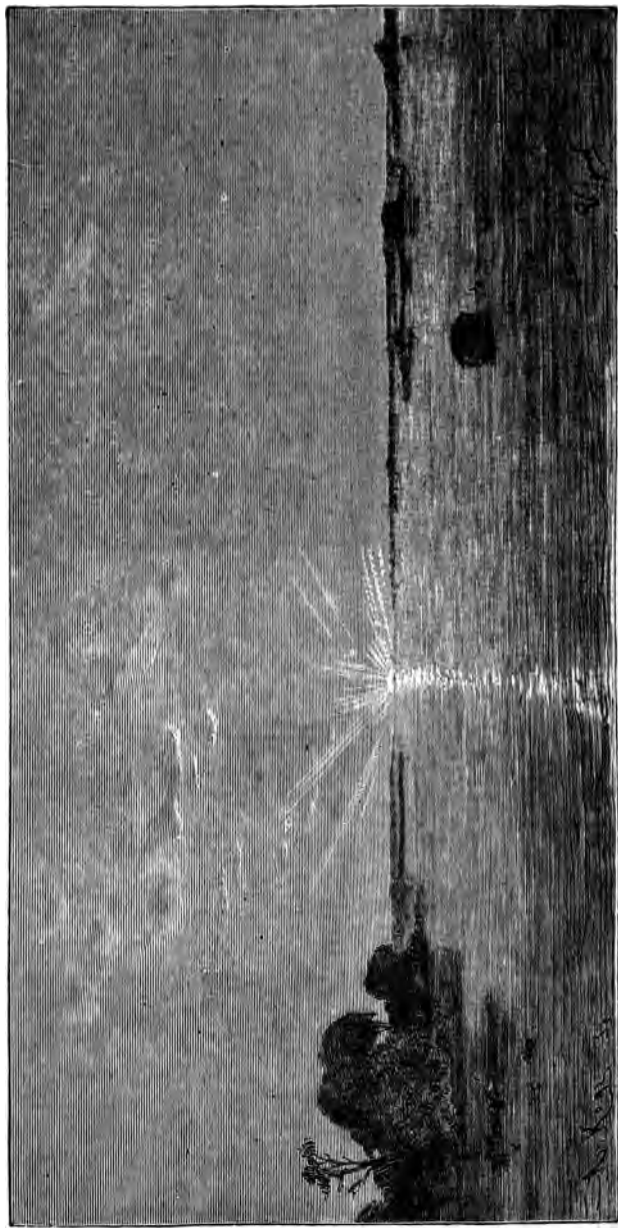
The chief article of export was formerly straw hats, made in the Huallaga, San Martias, and Moyobamba districts; but, unfortunately, it has decreased considerably, and now india-rubber is the most important. Other important exports are sarsaparilla, copaiba, chambore, peje salado (salted fish), &c.

IMPORTS TO IQUITOS.

The chief imports are American flour, hams and lard, axes, nails, twine, knives, gunny bags, cotton goods, beads, &c.

PERUVIAN PORTS ON THE MARAÑON OR UPPER AMAZON.

Peruvian territory begins at Tabatinga, which is about 2,000 miles distant from the mouth of the Amazon. It stands on an eminence of yellow clay, and is defended by twelve guns. Peruvian steamers connect at Tabatinga with the Brazilian line. The width of the river here is one and a half mile and the depth six to twelve fathoms, according to the season. The first Peruvian port after leaving Tabatinga is Loreto, the capital of the province, distant twenty miles. The next place is Pebas, distant 131



VIEW OF THE AMAZON AT THE MOUTH OF THE NAPO,

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miles, and then Iquitos, distant from Pebas 100 miles. Mr. Hauxwell, the collector of birds, resided thirty years at Pebas. Iquitos is the principal town on the Marañon; it has about 2,000 inhabitants, and is the head-quarters of the Peruvian fluvial navy. It is situated on an elevated plain on the left bank of the river, sixty miles from the mouth of the Napo, and about 2,251 miles from the Atlantic. Here are the Peruvian Government ironworks, carried on by English mechanics, and a saw-mill. The Peruvian Government first sent steamers to the Marañon in 1853. According to the report of the naval commanders at Iquitos, in 1884, thirty-eight steamers (thirty Brazilian and eight Peruvian) arrived at Iquitos, with a tonnage of 7,469, the largest being 680 tons burthen, and thirty-nine steamers left Iquitos. Nauta is the next town; distance from Iquitos forty miles. It lies on the north bank of the Marañon, opposite the entrance of the Ucayali; it contains 1,000 inhabitants, and trades in fish, sarsaparilla, and wax.

YURRIMAGUAS.

The next important port is Yurrimaguas, situate on the Huallaga 123 miles from its mouth, and about thirty-three miles distant from Nauta. This is the highest point of *steam* navigation on that river. Yurrimaguas is the port of Moyobamba, a city of 10,000 souls, a six-days' journey south-west. Professor Orton says:—"Yurrimaguas is a collection of 100 mud huts. It is a busy place when the steamer calls for hats, salt, sarsaparilla, rum, cotton and fish. But Yurrimaguas is the emporium of a region richer by far in natural wealth than the Empire States—the entire eastern slope of Northern Peru." The Peruvian steamer *Morona*, of a tonnage of 500, and engines of 150 horse-power, makes monthly trips between Yurrimaguas and Tabatinga, connecting therewith the Brazilian line. The river Amazon is navigable for 2,600 miles, and steamers as large as 800 tons can reach as far as Borgas and Yurrimaguas, ports standing on the spur of the Andes mountains, and in the centre of the Amazon provinces. The many tributary rivers are all navigable for flat-bottom steamers and steam launches. The whole

country is covered with a boundless forest. The india-rubber tree is abundant, and forms a most valuable article of commerce; other products, such as cocoa, coffee, vanilla, sarsaparilla, indigo, vegetable ivory, dyes, balsams, &c., are waiting there to be gathered by the hand of man.

EXPLORATION OF THE RIVER MORONA, AND THE UPPER
MARAÑON.

(Translated from Raimondi.)

By command of the Loreto Department an exploration of the upper Marañon took place in 1867, under Señor Vargas, when it was ascertained that the Indians inhabiting its banks were, as a rule, well disposed and easily brought to adopt civilised customs and habits; that the country was rich in gold, and that the abstraction of this metal was attended with risk, as there still remained some hostile Indian tribes; and that navigation, with the exception of a few shallows of no great extent, was practicable. This expedition, which started from Iquitos, explored these rivers for a distance of 494 miles. Señor Vargas measured the distance from Iquitos to the last point he reached in the Upper Marañon, and gives the result as follows:—

Ports.	Distance from each Port.	Distance from Iquitos.
	miles.	miles.
From Iquitos to Omagua	48	48
„ Omagua to Nauta	35	83
„ Nauta to San Regis	34	117
„ San Regis to Parinari	63	180
„ Parinari to Vaca Marina	42	222
„ Vaca Marina to Urarinas	44	266
„ Urarinas to Frontivera	26	292
„ Frontivera to Caserio del Cedro	30	322
„ Caserio del Cedro to San Antonio	82	404
„ San Antonio to Barranca	20	424
„ Barranca to Limon	42	466
„ Limon to Isla de Nacacuyaga..	28	494

LIST OF THE PRINCIPAL LATITUDES AND LONGITUDES, MAGNETIC VARIATIONS, BAROMETER ELEVATIONS AND DISTANCES, ESTABLISHED BY THE PERUVIAN HYDROGRAPHICAL COMMISSION, 1873.

Place.	Latitude, S. ° ' "	Long. W. of Greenwich. ° ' "	Variation of Compass. ° ' "	Elevation. m.	Distance from Iquitos, miles.
<i>Marañon</i> .—Lower mouth of Javari River	4 18 45	69 53 10	5 38 54 E.	81,075	315 From Javari.
Loreto	3 54 20	70 7 55	5 11 24	87,171	53½
Iquitos	3 44 15	73 7 30	5 56 0 E.	89,914	315
North of the Ucayali	4 28 30	73 21 30	7 2 0 E.	96,924	376½ From Iquitos.
Lago Puca-curo	6 4 45	75 1 10	7 22 10	114,908	856
<i>Puerto de Sarayacu</i>	6 35 15	74 58 30	7 52 8 E.	124,967	431
Paca mashi	7 53 15	74 41 45	7 51 38 E.	132,557	607
Yarina-cocha	8 15 0	74 31 30	7 38 30	136,245	672
Mouth of the Pachitea River	8 43 30	74 32 30	8 45 40	154,837	705
<i>Pachitea River</i> .—Cañu-yacu (Hot Water) Inca Rock; at this place there are nume- rous hieroglyphics cut in the sand- stone cliff	9 5 52	74 48 15	8 59 26 E.	109,773	835
Confluence of the Pichis and Palcazu ..	9 9 4	74 55 45	8 6 26	...	837
<i>Pichis River</i> .—Pochelle Playas; naviga- tion is clean up to this point	9 54 9	74 58 45	7 34 4	188,365	936
Tempestad Playa	9 57 11	75 2 0	8 35 36 E.	...	971
Mouth of the River Herrera-yacu	10 5 6	74 55 45	7 46 0 E.	...	996
Puerto Tucker; highest point navigable in canoes	10 20 3	74 54 0	7 59 26	...	1,030
<i>Herrera-yacu River</i> .—Terminacion Playa, highest point of navigation in canoes ..	10 22 55	74 49 0	9 7 30	213,359	1,041
<i>Palcazu River</i> .—Puerto del Mayro ...	10 22 33	74 54 0	7 47 52	...	1,034
	9 55 22	75 17 45	7 28 54	242,315	992

INDIAN TRIBES OF THE MONTAÑA.

Translated from SEÑOR ANTONIO RAIMONDI'S work, "El Perú," Lima, 1879, by permission of the author.

The *Marúbas* on the Javari have a dark complexion and a slight beard. On the west side of the river roam the *Majeronas*, a fierce, hostile, light-coloured tribe of bearded cannibals.

The *Jivaros*.—It is well known that the Santiago is much populated with savages (the Jivaros, a large tribe and one of the most warlike in South America), and that the names of many are mentioned who have been victims to their treacherous attacks, who, carried away by the enthusiasm of exploring the ancient famous gold-washings, have trusted to the treacherous friendship of the Jivaros, who in remote times destroyed in a single night numerous flourishing towns, and amongst them Sevilla del Oro, which was situated on the banks of the Santiago, killing all its male population. The missions at Moco and Guayaquiza have produced as yet no practical result. This tribe occupy the country generally from the Upper Pastaza to the Santiago, down to the Pongo of Manseriche. According to P. Castrucci, the Jivaros number about 1,600; they live like the Yaporos. They rear pigs and fowls in abundance, hunt monkeys, and eat all kinds of animals; cultivate plantains, yuca, caniotés, pupus de nointe, pine-apples, and sugar-cane. They have the custom of preserving their dead, drying them by means of a slow fire and much smoke, and so reducing them to mummies.

The *Yaporos* do not exceed a thousand, they are scattered over an immense tract of land, and their villages are very far apart. Their houses are constructed of the boughs of a palm called tarrepoto, and are 25 yards long, by 18 feet wide, and are inhabited by from twenty-five to thirty persons. They sleep in hammocks, and always have by their side a candle, which infallibly burns the whole night. Each man lives with three or four women, who live in the greatest harmony among themselves.





A TAPUY INDIAN OF THE NEIGHBOURHOOD OF PEBAS.

Face page 52.

The *Ayulis*.—According to Raimondi, the Ayulis, who inhabit the river Morona, are generally well-formed, of sound disposition, and robust; are light in colour, have good eyes and beards, which they often cut, and they appear rational. Everything leads to the belief that this branch of the great Jivari nation is crossed with white or Spanish people. Tradition relates that in the days of colonisation (eighty years ago), the town of Logroño and other places were destroyed by the said Jivaros, in consequence of the great greed of the Spaniards for gold, which these Indians contributed to the Crown of Spain, and that they beheaded all the men, the barbarians taking away with them all the women, including the nuns of the convent of Logroño. The Ayulis, the same as the Patucas on the river Alangirsa (a branch on the left of the Morona), are kind, laborious, and clever; they make good canoes, and cultivate in abundance yucas, plantains, maize, onions, and beans. They likewise cultivate cotton, with which the women make very gay woven clothes, which they wear. They rear fowls, chanchos, and dogs.

The *Conibos* occupy the extremity north of the territory of the Huilcamayo and part of the prolongation called Ucayali; the extent of their territory is eighty-two leagues, = 246 miles, beginning from the river Simpa and extending to the Capisinia. The land is flat and woody, and the atmosphere is humid. The climate is considerably hot, except in times of storms, when the temperature is much lower. The Conibos are small in stature, brown in colour, their bodies are fat and almost womanish, their features are proportionate, and they have their noses less flattened than other Indians. The women have ugly faces, and deformity in proportion to the body. They wear the same kind of clothes as the Piros, being different to them only in colour, which is snuff-colour. They speak pausingly, and their guttural sound is not so pleasing as that of the Tampis and Piros. They are circumspect, reserved, and distrustful. They cultivate a great deal of land, and fish for turtle, which is called charapa.

The *Shipibos* are the fourth tribe, which have an extent of district of sixty-four leagues, = 192 miles long, on the river Ucayali, a continuation of the river Huilcamayo, from the

river Caspusina to the Sarayacu. The country is level and has extensive forests. Their products consist of wax, vanilla, aguardiente, rice, and, in the Huallaga district, salt. The climate is that of the Conibos. In the vicinity of Pebas dwell the inoffensive *Yaguas*. Near Nauta dwell the tall, finely-built *Cucumas*, shrewd, hard-working canoe-men, notorious for their singular desire to possess property; and the *Zamoes*, a white tribe, who wander across the Marañon, as far as Sarayacu. Mr. Alf. Simpson says:—"All the Indians of the Napo, Pastassa, and Putumayo, who have had contact with or even heard of white men and baptism, show the greatest distaste for the despicable title of Ancas (heathens), and invariably disclaim it for themselves, but I fear their religious zeal goes no further."

The *Quichuan* is always submissive to your face but slow to perform; soured by ill-treatment, he will hardly do anything unless he is compelled. He will do nothing well unless he is treated as a slave. Treat him kindly and you will make him a thief; whip him and he will rise up and thank you, and be your humble servant. Servile and timid, superstitious and indolent, the Quichuans have not half the spirit of the North American Indians. It has passed into a proverb, "The Indian lives without shame, dies without fear, and eats without repugnance."

The *Antis* or *Campas*.—From the point of the Chaguaris, situated on the right bank of the Huillcamayo,¹ at the commencement of the river region of the Montañas, lies the territory of the Antis or Campas Indians, extending 75 leagues up to the confluence of this river with the one called Comisia. The country is rocky and hilly until arriving within a mile of the Chibucuni cascade, when it gradually disappears, meeting afterwards only some promontories, commencing with the pampas of Sacramento. The climate is very hot, sky generally clear, except when there are rains; agreeable breezes blow during the day, tempering the heat. The course of the river through the rocky country is very winding; there are 125 rapids.

The men are generally of an average height, bronze in colour, with small faces, short and flat noses, eyes black without vivacity, heavy lips, small hands and

¹ Necklace River. *Huillca* means necklace, and *mayo* river, in Quichua.



INDIANS ON THE UCAYALI.

Face page 53.

feet. The little beard they possess they pull out by the roots with two shells, which serve them as pincers; they have a pleasing physiognomy; they do not paint the face; the women are generally ugly. Both sexes have long hair, and cut it at the birth of their first son, and usually at other births.

Of the savages who inhabit the banks of the Huilcamayo and the Ucayali, this is the only tribe in which the women appear modest in dress. Some of the men are accustomed to place a wooden hoop with bird-feathers on their heads, but this does not betoken any distinction. It is common among both sexes to hang from the gristle of the nose a kind of silver medal, and make a hole below the lower lip into which they introduce a wooden peg; it is likewise customary to tie woven cotton bands round the ankles and wrists and to adorn the neck with necklaces of bugles or small carved pieces of wood, from which hang threads which fall upon the shoulders, on the ends of these threads they tie the dried plumage of birds. Their mode of speaking is pleasing, being soft, and delivered in a kind of chanting monotone. They are of a melancholy disposition, not very frank, and naturally indolent, as the cultivation of the land is exclusively attended to by the women. A Campa seldom is cheerful, and the most that can be obtained from him in that way is an expression of approbation. They take an interest in anything only when they desire it, but it is just to say they possess no bad intentions.

There are other Indians as well as the Campas who are without a history, although by tradition they are said to have held sway over the savage *Piros*, their rivals and neighbours. There is no doubt that were they to live united they would be richer in productions, and improved in character; but at the present time it is otherwise, because they have become at variance through the wars which have taken place. There are hardly two families which are united; the shortest distance of one house from another is not less than three leagues, and sometimes as much as eight; their habitations are not built on the banks of the river Huilcamayo, but on the plains, on the top of the quebrada (broken country). These precautions are necessary, because the *Piros*, who usually go to the Cháguaris in the month of July, carrying animals from the Montaña and other articles of barter, rob as many

people as they can on the road. It is only when a Campa is pressed by hunger that he goes out for provisions, as otherwise he would never exert himself to procure them. They sleep extended on the ground near a fire, their feet placed as near to it as possible. When one of them dies, they throw the body into the river, after tying the hands and feet, and placing large stones upon it to submerge it—a precaution they adopt to avoid its reappearance, as they are taught by an old tradition. They do not recognise a chief, for although they have some whom they call captains, they never show any obedience to them; this title is given them in consequence of having acquired great dexterity in hunting and fishing, and for possessing a knowledge of at least two or three dialects. They are without any religious belief, and only have an idea of an evil being, whom they call *Camac arinchi*, and in other tribes *Miajamunchi Iltuchi*, equivalent to the devil. Polygamy is in practice amongst all the savages, each one keeping as many women as he can, taking them from their parents, and giving them in exchange hatchets, knives, and other hardware; the orderly manner in which they live together is remarkable. Their agricultural productions are coca, tobacco, cotton, yucas, racachas (a plant, a kind of papas or potato), camiotos (sweet potatoes), plantains of three sorts, pines, papayas, sugar-cane, maize, and mani (gum). Game and fish are not plentiful. The articles of commerce which the Indians receive in exchange for their products are hatchets, knives, scissors, needles, fish-hooks, buttons, beads, &c.

The *Marubos*, on the Javari river, are of dark complexion, with a slight beard. On the west side of Narwei roam the *Majeionas*, a fierce tribe of hostile, light-bearded cannibals.

Bovo de Revello, an Italian friar, who has travelled a great deal in various parts of the world, and who is himself a clever naturalist and geographer, states, as his opinion, that for missionaries of scientific tastes there are boundless opportunities in the interior of Peru for pursuing their investigations while engaged in spreading the Gospel.



COMPARISON OF AMAZONIAN VOCABULARIES.

English.	Tupí.	Quichua.	Omégua.	Yágua.	Tucúna.	Cocána.	Jévero.	Yáparo.	Cónibos.	Cámpa.
Man ...	Abajaso ...	Runa ¹	Apísara ...	Huano ...	Iyaté ...	Yapisara ...	.....	.....	Huóvo ..	Chirari
Woman.	Cunba ...	Huáirmi	Huaynsow.	Huapiruna	Ihié	Huayná	Quapilusa ..	.....	.....	Chinani
Father.	Ipaya ...	Yáya ² ..	Tapapa ...	Yen .....	.....	Tatahua	Papa	Apocboja ..	Papa ...	Apá
Mother.	Iwaya ...	Máma	Tamama ..	Nihua ...	.....	.....	Ahua	Anno	Icla	Ina
Head ...	Iacam ...	Uma ...	.....	.....	.....	Yakí	Mata .....	.....	Huasca.	Nogoti
Hand ...	Po	Maqui	.....	Samutú ..	.....	Itua	Landic	Cuichoac .....	.....	Naco
Foot ...	Pui	Chaqui	.....	Nimatú ..	.....	Pinta .....	.....	.....	Tau ...	Nachapagái
Water.	E	Yacu ...	.....	Ash	Dechieb	Une	Dik .....	.....	Nasin ..	Churio
Fire ...	Tala ...	Niná ...	Taca	Jigney ...	Ejteh	Tata	Prim .....	.....	Quiche.	Chichi
Day ...	Ara	Punchas	Ara	Niana ...	Hunebi	Ciruchi	Ooktili ...	.....	.....	Quintalinta
Night ...	Putuna	Tuta ...	Epuesa ...	Neporá ..	Suitán	Ipsinga ...	Dikpolik ...	.....	.....	Echitiniqui
Sun ...	Coraci	Yncuti ...	Vel	Hini	Ehajeñ	Caruchi ..	Quecki ...	.....	Vari ...	Ponatin
Moon ...	Yacé ...	Quilla ...	Yacé ...	Arimaney	Tahue majeh.	Yasi	Darguir ...	.....	Ushi ...	Cuchoi
One ...	Jépe ...	Huc	Uijepe ...	Tiqui ...	Huech	Huipi	Alazá	Noqui	Avicto ..	Impoquiro
Two ...	Moc/en ...	Isheay	Mocuyta	Nanoijoi	Tarepuech	Mogacapuca	Catula	Ammasaniqui	Raboi ...	Pitari
Three ...	Méapéré.	Quimsa	Mosaperuta	Nomuhl ...	Towepuech	Mutoa-parika.	Cola	Imucá } maraqui	.....	Candú

¹ Runa is the general philosophical expression to designate mankind, speaking by sex is Hari

² Yáya means the older. Tuyta is the usual term.

VOCABULARIES FROM THE QÚICHUA, ZÁPARO, AND YÁGUA LANGUAGES.

English.	Qúichua.	Záparo.	Yágua.
Father	Yáya or Tayka..	Apochojó ...	Yen
Mother	Máma	Aúno	Nihuá
Son (said by father)	Chúri	Niáto	Poén
Son (said by mother)	Cári huáhua ...	Tanquí	Poén
Daughter (said by father) ...	Ushúshi	Coniát or cuniató	
Daughter (said by mother) ...	Huármi huáhua.	Itúm	
Own father	Quiquin yáya ...	Cuqu máno	
Own mother	Quiquin máma ..	Ia Cuáno	
Stepfather	La yáya	Táma quíra	
Stepmother	La máma... ..	Táma quíra (máma ?)	
Own son	Quiquin chúri ...	Ia cuniána	
Stepson	Quipai chúri ...	Saquína cuniána	
Elder son (said by father)	Cúra (or ñáupa) chúri	Cuniapíra	
Elder son (said by mother)	Cúra (or ñáupa) huáhua... ..	Cuniapíra	
Youngerson(said by mother) ...	Súlca (or quípa) chúri	Nunoé	
Younger daughter (said by father) ...	Súlca (or quípa) ushúshi	Nunoé cuniató	
Only son (said by father)	Zapálla(or zapái) chúri	Noquí cuniána...	Tíqui rai (huahua)
Only son (said by mother)	Zapálla(or zapái) cári huáhua	Noqui túacho cuniána	Tíqui rai (huahua)
Grandson	Cári huáhuay ...	Cuajenáño	
Granddaughter.	Huármi huáhuay		
Great grandson.	Cári villca ...	Cuajenáño	
Great great grandson	Cári chupúllu		
Grandfather	Hátun yáya ...	Quirráito piatzo	Yen
Grandmother	Hátun máma ...	Quirráito occuáje	
Great grandfather	Machúi yáya ...	Quirrishepúi	
Great grandmother	Payo (or ápa) máma	Pára	
Great great grandfather ...	Apúsqui (or Apúnahe) yáya	Piátzo	

English.	Qúichua.	Záparo.	Yágua.
Ancestors ...	Apúsqi cuna ...	Idasipóá	
Brother (said by male) ...	Hauaúqui ...	Cuquitiáño ...	Rai táire
Brother (said by female) ...	Túri	Cuánuo	Rai puipuím
Sister (said by male) ...	Pána	Cuirimáto ...	Rai pópo
Sister (said by female) ...	Náña... ..	Taquí	Rai taírete
Elder brother ...	Cúrac huaúqui..	Irishia cuquiño	
Younger „ ...	Súllca huaúqui..	Noquí	
Cousin (said by male) ...	Chispa huaúqui.	Cuaneráno ...	Primoíne
Cousin (said by female) ...	Chispa tuni ...	Cuaneráno ...	Primaíne
Second cousin...	Cailla chispa huaúqui ...	Cuaneráno (or Cuanerania)	
Third cousin ...	Cáru chispa huaúqui ...	Cuaneráno (or Cuanerania)	
Uncle (father's brother) ...	Yáyapác huaúqui (or háchi) ...	Taúco	
Uncle (mother's brother) ...	Mámapác (or caca) turi ...	Cuanoro	
Aunt (father's sister) ...	Ypá (or Maraño tiaíne)	Cuiquiña	
Aunt (mother's sister) ...	Mámapác ñaña..	Cuáno cuño	
Father-in-law ...	Cacáy (of male); quihuachí (of female)		
Mother-in-law...	Quihuác (of male); Quihuachí (of female)		
Son-in-law ...	Másha	Acamia ...	Quiria
Daughter-in-law	Kachún	Cuari ráno	
Brother-in-law..	Masani (orcatáy)	Cuajino jóno	
Sister-in-law ...	Ypá (or Kachún púra)		
Godson	Chúri cáshcai (or Cháscái) ...	(not used)	
Godfather ...	Shutichío (or Shutísihca)		
Godmother ...	yáya	Na chiatáno	
	Shutichíc (or Shutísihca)		
	màma	Noachozáno	

English.	Quíchua.	Záparo.	Yágua.
1	Aillu... ..	Cuaramá	(same as brother)
Husband	Kosa (always the & guttural) ...	Cuirán	Rai-huáno
Wife... ..	Huáirmi	Cuirichán	Rai-huaurá
Widower	Huácicha cári ...	Machicho	
Widow	Huácicha huáirmi	Machicho	
Twins	Yshcai huach- .. áshca (or hua- chác)	Sáro	
Hand	Maquí	Cuichoác	Samutú
Foot... ..	Chaquí	Cuiñocá	Nimatú
Fingers	Maquí pálca ...	Canasú	
Toes... ..	Chaquí pálca ...	Cuiñocá canasú	
Thumb	(Nose separateterm for thumb or leg toe)... ..	Cumacaná	
God	Apunchi - yaya (God our Fa- ther)	Piátzo	Tupaná
One	Shuc (or Shug)	Noquí	Tiquí
Two	Ishcay	Ammassaniquí...	Nanoíjoi
Three	Quimsa	Imucú maraquí..	Momuhí
Four... ..	Tahua	Above 3 they	Nañunjuía
Five	Pischa ... (or pitchca)	have no name, but show their fingers. They	Tanaíjo
Six	Sócta	do not count	Tiquí ñiháte
Seven	Cánchis	above ten.	Nañoujaiáte
Eight	Púsac (or Púsag)		Momun- huaiáte
Nine... ..	Iscún		Nañauyuía- áto
Ten	Arunca		Naujui
Eleven	Chúnca-hucniok		(go no higher)
Twelve	Chúnca - ishca- niok		
Twenty	Ischa-chúnca ...		
Twenty-one ...	Ischa - chunca- huc		
Thirty	Quimsa-chunga..		
One hundred ...	Páchac (or Pátzag)... ..		
One thousand ...	Guarángo... ..		
10,000 would be	Chúnga - guar- ánga		

Ordinal numbers.—Niqui is joined to the number, thus:—1st is Shug Niqui; 2nd is Ischay Niqui, &c.

The Conibós count by twos. Thus, one is avicho; two is rabói; above two, so many two's, as:—four (= two 2's), rabói-rabói; six (= three 2's), rabói-rabói-rabói.

Authors assign to South America from 280 to 700 languages, of which two-fifths are composed of idioms radically distinct. The polyglot America is antipodal to the Chinese; the language of the former is richest in words; that of the latter the poorest. The preposition follows the noun, and the verb ends the sentence.

POPULATION OF THE AMAZON.

Prof. Orton says:—"The valley of the Amazon is probably the most sparsely populated region on the globe. There are not 40,000 souls along the banks of the rivers in the whole of the Amazon and the Marañon. Many of the towns marked on the map do not exist, or are represented by a solitary palm hut. The visible population is almost confined to the circumference of the valley; as at Pará at the mouth of the river, at Moyobamba, and at Tarapoto. The great basin is filled with a continuous, dark, primæval forest, rarely disturbed by the hand of man, and into which daylight seldom enters. Yet imagination peoples this pathless wilderness with uncounted swarms of savages. There are, it is true, numerous clans, we can hardly call them tribes, which, though dignified with separate names, are insignificant in numbers, barely numbering a hundred each. Raimondi puts down the number of all the wild Indians on the Marañon—that is, in the whole province of Loreto, which stretches from Equador to Cuzco, and from the top of the Andes to Brazil—as from thirty to forty thousand. To this must be added another forty thousand to include the civilised tribes, half-castes, and whites."

CHAPTER V.

Reports of Scientific Travellers.

REPORT OF M. OLIVIER ORDINAIRE ON THE NAVIGATION
AND COLONISATION IN THE AMAZON PROVINCES.

THE following is extracted from the Report by M. Olivier Ordinaire to the Geographical Society of Paris, 1886. This traveller, having lately made a journey across the Andes, gives a full description of the country he passed through. He states :—

Owing to the badness of the roads, goods are at present transported on men's backs, and the journey from Lima to Iquitos generally takes forty-five days to accomplish. He passed down many of the rivers, studying the numerous productions of its valleys, and the advantages they offer to commerce and colonisation. His report is limited purely to commerce and statistics. Caucho, or india-rubber, represents the greater part of the exportation. According to the Manifests in the Custom House of Iquitos, there was exported during 1884 and 1885 :—

	1884.	1885.
India-rubber... ..	540,529 kilos	714,161 kilos
Straw Hats	48,204 pieces	32,770 pieces
Tobacco	22,714 kilos	23,110 kilos
Sarsaparilla	18,586 „	7,469 „

The Loreto Department has also exported, in lesser quantities, vegetable ivory, cascarilla, copaiba, parchi or pirarucu, chambira (textile vegetable material), and a certain quantity of gold taken from the affluents of the river Marañon, which, not having been registered in the

Custom House, has not been valued. The navigation of the main Amazon River is represented by 150 sailing-ships and many lines of steamers, which carry on a regular service from Para—the port at the mouth of the Amazon—with Manaus, situated 872 miles up the river. The following is the list of steamers and the number of voyages they made during last year to the Amazon. The Brasileira del Sur Company's vessels made thirty-six voyages to Para and thirty-six to Manaus. The North-American Steamship Company's vessels made twelve voyages to Para and twelve to Manaus. The English Company, Booth Line, made twelve voyages to Para and nine to Manaus. The English Company, Red Cross Line, made twelve voyages to Para and nine to Manaus. Para possesses thirty-seven steamers, from 100 tons to 700 tons. Some of them at fixed dates ascend the Purus and Madeira. Large steamers ascend the river, not only to Iquitos, but as far as Yurrimaguas, on the Huallaga. The distance from Manaus to Iquitos is 1,130 miles, and from Iquitos to Yurrimaguas 458 miles. The following table shows the steamers navigating the Peruvian Amazons :—

Name of Steamer.	Flag.	Tonnage.	Journey.	No. of voyages per annum.
<i>Santarem</i> ...	B.	400	Manaos to Iquitos ...	12
<i>Solimoes</i> ...	B.	200	Manaos to River Javari	12
<i>Macapa</i> ...	B.	680	Para to Yurrimaguas	4
<i>Juruti</i> ...	B.	200	" "	4
<i>Gran Para</i> ...	B.	500	" "	4
<i>Amazonia</i> ...	B.	570	" "	4
<i>Angosto</i> ...	B.	240	" "	4

The river Javari—which separates Peru from Brazil—is navigable for a distance of 260 miles, and has not only been visited by the *Solimoes*, but also many times by the *Solimoes* and the *Amazonia* on their return voyage. The river Ucayali is, of all the affluents of the Upper Amazon, that which exports most india-rubber. It is navigable for over 700 miles.

SHIPPING.

X
Twelve steam launches, from 2 to 100 tons, belong to Iquitos and navigate the Ucayali and other Peruvian rivers. Having descended the rivers Palcaza and Pachitea in canoe and balsa and the Ucayali in steam-launch, M. Ordinaire proceeded to Nauta (a port on the Marañón) in the steamer *Amazonia* and ascended the river as far as Yurrimaguas and descending the Amazon to Para, after having made a voyage of 120 miles in the river Yavari. The voyage of the *Amazonia* to Yurrimaguas, going and returning, with all its stoppages, lasts three months. M. Ordinaire left Para at the beginning of November, 1885, and returned 3rd February, 1886. The steamers *Macapa* and *Amazonia* are the largest steamers which call at Yurrimaguas. The steamer *Viren* is of 600 tons register, but the vessels most convenient for the fluvial navigation are those having flat bottoms, which run no risks in crossing the bars of earth or sand. Steamers drawing over 12 feet of water during the months of July and August cannot call at Iquitos, being obliged at this season by lowness of the river to anchor half a mile off the port. In 1863 the bark *Arica*, of 800 tons, and drawing 17 to 18 feet (English) of water, entered Iquitos towed by the steamer *Morona*, of 500 tons.

EXPORTS FROM IQUITOS.

The report of the Sub-Prefect of the province of the Upper Amazon, Otoniel Melina, dated Iquitos, 2nd December, 1886, appears in the official Gazette *El Peruano*, 23rd December, 1886. In this report the Prefect urges the Peruvian Government to introduce European immigrants to those regions. He proposes that immigrants should be brought from Europe by the State's own vessels; the ships should be 800 to 1,000 tons burthen, auxiliary steam. Houses should be prepared beforehand to receive the immigrants, and a stock of implements and provisions given to them at the expense of the State, for at the end of six months their lands would be cultivated and they would be enabled to grow their own food and be independent of Government aid. Iquitos is

REPORTS OF SCIENTIFIC TRAVELLERS.

in a flourishing state on account of the great demand for india-rubber, which brings a mine of wealth to the merchants engaged in the trade. The value of the importations into Iquitos has been during the past six months as follows :—

	Value of Invoices.	Value in Peruvian Money. Soles.
Germany	M ^{cs} 6,383'00	1,595'75
Brazil.....	Reis 68,916'00	38,286'66
United States	\$14,916'84	14,199'84
France	Frcs 228,353'40	45,667'08
England	£14,338 16 10	71,694'20
Portugal	Reis 1,687'401	1,874'89
Plaza	Reis 73,497'000	40,831'66
Aduana	Reis 133,938'000	74,410'00
		<hr/> 288,560'08

During the same half year, there have been exported from Iquitos 554,344 kilogrammes of india-rubber. The productions of the five districts which form the Lower Amazons are india-rubber, fine gutta-percha, brandy, vegetable ivory, copaiba, oil from the paca-marina, salted fish, sarsaparilla, building timber, gold dust, &c. These are the principal articles which serve for return for merchandise imported. Trade is rising in importance, and at times there is insufficiency of steam tonnage, and it is very desirable that this should be extended. The colony is a model of morality, order, and industry, and the obedience and respect shown to the authorities is admirable. The commercial and agricultural interests are flourishing under the good administration of the authorities of the colony. The blessings which Europe has hitherto derived from North America will soon flow to her from the Southern Continent. To the former the gate of entrance is only open to a few on certain conditions, but to the latter all are welcomed.

SPECIAL CUSTOMS TARIFF FOR GOODS IMPORTED AT AMAZONIAN PORTS.

M. Ordinaire continues :—Articles of importation are not subject to the Custom's tariffs, which affect goods landed in the ports of the West Coast of Peru. The import duties which, either at Lima or in the

Brazils are charged at 30 to 40 per cent. on the estimated value of the articles, are not charged on goods which come by the Amazons to Eastern Peru, but at $7\frac{1}{2}$ per cent. only on the invoiced value. The advantage is the same for the export trade. While the Brazilian india-rubber pays an export duty of 23 per cent. on its value, that which is exported from Peru does not pay more than 4 per cent.

The market at Iquitos has been for many years tributary to that of Para, which, from its long established connexion and from its maritime situation at the mouth of the Amazon, was the general depôt of these regions. But for some few years past, the increase of the exportations of the Loreto Department has permitted Iquitos, at least in a great measure, to free itself from this tutelage.

It now obtains direct from Europe or the United States its requirements, which undergo only one transshipment, at Para or Manaos.

From the statistics of importation of the Department, the countries with which trade is carried on are classified in the following order:—

- 1st. England.
- 2nd. United States.
- 3rd. France.
- 4th. Germany.
- 5th. Portugal.

ARTICLES IMPORTED.

England sends *indianas* (calicos) and ordinary cotton stuffs; the United States its flour, cheese, sewing machines, rough furniture, petroleum, and hatchets; France, silk stuffs, perfumery, wines, and preserves; Germany sends cashmeres, woollen and cotton goods, beer, and all kinds of fishing tackle, &c.; Portugal divides with France and the United States the trade in preserves; it imports likewise a light and commodious kind of shoe, the use of which is general in the Amazon regions.

Amongst the articles of considerable sale in the Montaña, and which is specially manufactured for it in the form which their habits and customs require, I will mention

the *ipulli*, a knife with a large blade, used for cutting grass, and the *machete* (axe), which every man carries who penetrates the forests.

SYSTEM OF TRADING.

One arroba (25·320 lb.) of india-rubber is worth on the Ucayali to the workman who supplies it, 10 soles (33s. 4d.) worth of goods. This system is suitable to the Indian, who fears neither hunger nor cold, who does not know what the words *wealth* and *misery* mean, and who only works in order to obtain the object which he has seen. In his turn the buyer who comes and seeks the india-rubber, in steam-launches or canoes, pays for it, at the least in part, with goods, and this system of direct barter causes an important coasting trade.

PROGRESS OF CIVILISATION AMONGST THE CAMPAS INDIANS.

If one ascends the rivers as far as the country of the Campas, who live in a region towards the Andes, natives are met with who have no idea of the value of goods compared with silver. A piece of money has no more value to them than a perforated bead, or a portion of a necklace. These Campas, who have been considered for a long time to be dangerous and rebels to all civilisation, are as capable of work as the others, and besides, carry out their engagements. In the confluence of the rivers Palcaza and Chuchuras, in a region which was up to the present considered as completely deserted, M. Ordinaire found the dwelling of a German, established there about four years. He had succeeded in drawing around him some sixty Campas families, who were living within several leagues' radius of his dwellings. They could gather about 100 arrobas of india-rubber annually. According to the calculation which he himself gave M. Ordinaire, each arroba is worth in Iquitos fourteen to fifteen soles (fifty-six to sixty francs), obtaining it for two reals (fivepence), that is to say, less than one franc, paid in goods to the Campas, who, besides, took care of his plantation of yucas and palms, and provided him with abundance of game.

The increase in distance, and expenses of transport, are far from counterbalancing such advantages. It may be in

general said, that for the working of the india-rubber and of similar products of great value, the most distant place in the civilised regions is the best for the colonist.

AGRICULTURE.

Although the land is fertile to excess, agriculture scarcely exists in the Loreto Department. All the activity of the colonists is absorbed in the working of and trading in india-rubber. Perhaps there does not exist a region more favourable for the cultivation of rice, and yet almost the whole of the rice which is consumed in the country,—where the land belongs to the first who occupies it,—is imported from Brazil. Potatoes are imported from Havre and Lisbon; this is a remarkable fact, when we take into consideration that Peru was the original country of the potato, and that if it grows badly in the Montaña, the neighbouring Cordillera produces it in abundance, and of the best possible quality. It is true that in order to seek for it, it would be necessary to make a road first, and this appears to be what the india-rubber gatherers think the least of doing.

The Peruvian Amazons do not export, in reality, other agricultural products than tobacco from Tarapoto. The sugar cane cultivated in some of the estates of the Marañon is converted into *tafia* (aguardiente from sugar), which is consumed in the Department. The plough is unknown. After having burned the land, they plant and sow without moving it. In the Ucayali valley they make use of the mud deposited by the river on its banks. When the waters are low, they sow on the beaches maize, turnips, onions, &c. Maize comes to maturity in four months, turnips and onions in three. In the estates on the Marañon, the sugar cane, three or four mètres high, is cut every eight or nine months.

FERTILITY OF THE VINE.

What attracted M. Ordinaire's attention the most in the immense Amazon regions was the fertility of the vines. His surprise was greater in meeting with vines along the road when he knew that in the Chanchamayo, an elevated valley of the Montaña, plantations had not met with success; and he was thus convinced that the failure of the trial pro-

ceeded from the omission made of not pruning the shoots. The first vine-stock which he found was in Yurrimaguas. It alone formed one immense bower which contained over 300 bunches of a medium size, of a good black colour, and slightly acid. He saw others similar on many estates, particularly in Caballo-Cocha, on the banks of a small affluent of the Marañon, and was assured in all these places that they yielded regularly *three crops annually*. By merely passing in transit he was unable, as is natural, to prove the fact himself, but it is certain that the vine gives in that country exceptional results. However, nobody has yet cultivated it in the Department for the purpose of making wine. All that is drunk in Iquitos is imported from Europe, and is very dear. The same occurs with vegetables, which come from the Ucayali, and are paid for at high prices. Thus it is that horticultural cultivation and the making of wine would give, in the neighbourhood of that town, safe and sure profit, perhaps more than india-rubber. In consequence of its separation from the capital, and of the want of means of communication with the Pacific, and likewise of the desire of the Peruvian Government to favour the colonisation of the rich regions of the Montaña, the Peruvian Amazons lead, from a commercial point of view, an independent life.—Translated from *El Comercio de Lima*, 22nd April, 1887.

EXPEDITION OF MR. GEORGE P. JAMES FROM THE
CHANCHAMAYO IN PERU TO THE ATLANTIC.*

Mr. George P. James, who has a sugar estate on the banks of the Chanchamayo river, undertook a journey to explore the region between that position and the Perene. His estate is near the village of La Merced, on the Chanchamayo. He set out on the 17th of July, 1886, accompanied by an Italian named Bogo, who could speak the language of the Chunchos, and was reputed to have a certain influence over them. But both these qualifications appear to have been much exaggerated. Mr. James resolved to

* Communicated by Mr. C. R. Markham, C.B., F.R.S., Secretary.
—From *El Comercio de Lima*, 3rd May, 1887.

follow up the right bank of the Paucartambo, and thence to reach the famous Cerro de la Sal.

In the hamlet of San Luis, which is situated on the Cerro de la Sal, they found a missionary named Sala. The good father arranged that the travellers should be accompanied by a lay brother, who turned out to be an energetic and courageous comrade. The party took leave of the good father, and set out in the direction of Palcazu, that is to say, they entered an unknown tract of country.

James was armed with a repeating rifle, a revolver, and a well-sharpened wood-knife (*machete*). Bogo was also well armed, and the lay brother was provided with a machete, an indispensable companion in that forest region. They pushed valiantly on, slipping through the dense undergrowth, or opening a way with their wood-knives, the compass being their only guide. At length they came in sight of the river Palcazu, which had been described to them as navigable. This, unfortunately, was not the case, at least in the dry season, and it was necessary for them to march along its right bank, following the course of the stream, and wading across the small tributaries, during three days, when they reached a point where the river was really navigable in *balsas*.

Between the Paucartambo and the Palcazu they only met with one river of little volume, which they easily crossed. It is one of the tributaries of the Perene.

At the point where the Palcazu became navigable, as well as at other places along the banks, they came upon habitations of wild Indians. These people appeared to be hostile at first, but as soon as they saw the cordiality with which the Englishman and the Italian drank their *masato*, and took part in their dances and noisy amusements, they forgot their suspicions and treated the strangers as old friends. When the drinking bout was over, the chief of these Indians was very useful, and it was due to him that they procured three small balsas, one for each traveller and an Indian in each to guide them. They embarked in the morning, taking care to fasten all their traps to the poles of the balsas, and at about noon, being carried down by the rapid current, they reached Chincheros, a place situated at the point where the river of the same name falls

into the Palcazu. This station appeared to have commercial relations with Huancabamba.

Proceeding on the voyage, the navigators stopped at a hut for the night, and during the hours of sleep the three Indians escaped in one of the balsas and were not heard of again, but they did not take anything. This accident caused them to lose all the next day, for the Indian who owned the hut refused to go with them. At length he yielded to their promises. They made one balsa out of the two which the fugitive Indians had left, and embarked once more.

After two hours the Indian, either by accident or design, lost his paddle, and, on the pretext of making another, he went into the forest and also disappeared. There was nothing left for the three adventurers but to continue the voyage alone, and this they determined to do. Nothing occurred during the following day. The current took them down the river with moderate speed, and no natives were seen on its banks. In the evening they selected a beach on which to pass the night, continuing the voyage on the following day. But at ten o'clock in the forenoon the balsa struck upon a rock and capsized. When Mr. James came to the surface the lay brother was already on the cap-sized balsa, and Bogo was swimming with one hand on it. Mr. James soon reached it also. Half an hour afterwards, swimming down the river with the help of the balsa, they succeeded in beaching her just at the point where the river Lagarto falls into the Palcazu.

The things which were on the balsa had all been well secured, and, with the exception of Mr. James's boots, nothing was lost in the shipwreck. The afternoon and night were passed without food, but next morning an Indian came to their help, lighted a fire, and enabled them to appease their hunger with boiled yucas. Having dried their clothes, refreshed themselves, and righted the balsa, they continued the descent of the river, and arrived next day at the junction of the Pichis with the Palcazu, when the united stream is called the Pachitea. Here they had the pleasure of meeting the Peruvian india-rubber collector, Davila, who was on a voyage with a small supply of that product, and who conducted them to a place

called Santa Isabel, the residence of a German india-rubber merchant.

They remained at Santa Isabel for a whole week, waiting for another india-rubber collector. At length he arrived, accompanied by two monks, who said they were going to the Pozuzu, though it afterwards turned out that they were on their way to the Pichis. The lay brother joined them, so that Mr. James was left with the Italian Bogo as his sole companion. They made the voyage down the Pachitea in a canoe, guided by the india-rubber merchant. It was prosperous down the whole course of that great river, but on arriving near its junction with the Ucayali, owing to having started before dawn, the canoe struck upon the trunk of a tree half-covered by water, and capsized. This time the travellers lost everything they had with them.

The position where this accident befel them was a mile above the confluence of the Pachitea with the Ucayali. The canoe was not stove in, so that they were able to right her again and to reach a place where they fell in with the small steamer *Mayro*, which took them down to Iquitos. After a forced residence of five weeks at Iquitos, Mr. James continued his voyage to Pará; proceeding thence to Barbadoes and Trinidad, he returned to Peru by way of Panama. On May 7, 1887, he left Lima on his way back to his estate on the Chanchamayo.

During the whole of his journey Mr. James only saw two snakes and one puma; the puma walked past his camp at night without doing any harm. Mr. James has thrown light on the geography of a part of the forest-covered Montaña of Eastern Peru which was previously unknown. The practical results of his voyage are not without interest. The Palcazu is not really a navigable river, but the Pichis is suited for navigation. The latter river is, therefore, the point to which attention should be turned by those who desire to open a practicable route from the central regions of Peru to the Ucayali. At present 5,000 men from Tarapoto, machete in hand, are occupied in felling the caoutchouc trees on the hills overlooking the Pichis. The *caucho* (*Castilloa*?) india-rubber tree is felled, while the *jefe* (*Hevea* or *Sphonia*?) is merely cut across the bark of the trunk, to obtain the caoutchouc juice. Hence the mischief that is

being done by these 5,000 men from Tarapoto is considerable, although the caucho-trees increase and multiply with comparative rapidity. Another army of depredators comes up the Ucayali, and another up the Javari, for the exclusive benefit of Brazilian trade.

Mr. James does not think that it would be of immediate utility to open a road from Chanchamayo to the Pichis, because, by the time it was finished, the 5,000 *caucheros* would have completed the work of destruction. It would be useless to open such a road for purposes of exportation so long as a heavier freight is paid for goods from Iquitos to Pará than from Callao to Europe. As regards the export of timber on a large scale, there already exists a North American colony at Santarem occupied entirely in the timber trade.

In Mr. James's view, the most useful measure, as regards the Peruvian forest region, which is very fertile and enjoys a healthy and agreeable climate, would be its colonisation. When that is effected, the construction of good routes to the Ucayali will become necessary.

Mr. James is an enthusiastic traveller, and is willing to take part in any other exploring expedition which may be undertaken by the Peruvian Government.¹

PROFESSOR ORTON'S DESCRIPTION OF THE AMAZON PROVINCES OF PERU.

Respecting the eastern slope of the Andes Mountains, which lies in Peruvian territory, no traveller has made a deeper research into these regions than the late Professor Orton, the eminent North American explorer, who threw himself most earnestly into the noble work, and has left to the world the valuable results of his labours. He says :—Peru has immense capabilities. She is the France of the South American continent. All the fruits and grains of the earth here find a congenial and fertile soil. With the great Pacific on her left, and the navigable sources of the Amazon on her right,—with mountains of

¹ "Proceedings R.G.S.," August, 1887.

mineral wealth untouched—with highland valleys, like the overhanging gardens of Babylon for beauty, and with plains and reclaimable pampas which might equal Egypt in fertility, Peru is potentially one of the richest countries on the globe.

No other country can furnish 6,000 miles of continual internal navigation for large vessels. For 2,000 miles from its mouth the main stream has not less than seven fathoms of water, and not a fall interrupts navigation for 2,600 miles. It is impossible to avoid asking the question what is to become of this great region—this grand system of inland navigation—these thousand and one products of nature? The wealth of an empire is yearly lost in these boundless forests. These rich resources, lying almost at our very doors, must soon appeal to that restless spirit of enterprise and commercial activity which, not content with its past triumphs, longs for new conquests and a wider field of exercise. The Marañon (the name given to the upper part of the Amazon as it enters Peruvian territory) is a region of inexhaustible fertility, and would yield ample return to energy and capital. The villages are open to foreign commerce free of duty; but at present the voice of civilised man is seldom heard save on the fluvial highway between Moyobamba and the Brazilian ports.

One looks forward to the dazzling future of this great valley, when the ships of all nations will crowd the network of rivers for the gold and perfumes, the gems and woods of the great Western Ophir.

PROFESSOR RAIMONDI ON THE AMAZON PROVINCES
OF PERU.

Letter from SEÑOR ANTONIO RAIMONDI to SEÑOR DOCTOR MARIANO M. ALBORNOZ, on the suitability of the regions of Cahuapanas for emigration. Translated from "El Nacional," 1st July, 1887.

CAHUAPANAS, June 23, 1887.

MY ESTEEMED FRIEND,—I reply to your favour of this day. I feel that your patriotic works are not understood as they should be; but this is not to be wondered at, as

no great work has yet been accomplished without the promoters having experienced many hardships and difficulties in the undertaking. But, on the contrary, all that is taking place will show you that the steps you have already taken are making good progress. I can only advise you to persevere, because you have already given more than sufficient proofs of abnegation and exemplary firmness.

Besides, proved as it firmly is of the absolute necessity of the opening of a road from Chachapoyas to the navigable port of the Marañon, and, it being practicable, you ought not to leave this work until you see it accomplished, because all indecision would, under the present circumstances, be most inconvenient, which in your work is shown to be so necessary for the advancement of the Departments of Amazonas and Loreto.

Nothing less than the opening of this road will attract immigrants in sufficient numbers, the lands in these parts being those most suitable for agriculture; they contain natural resources in abundance, and the excellent climate makes them inhabitable. The opening of this road would greatly aid the establishing of populous towns, which would be the nucleus of others that would be established through the influx of immigrants to this region.

In Europe and the United States the advantages which the places before mentioned offer for emigration are well known, since many travellers have spoken of the fertility of the soils, of the geniality of the climate, and of what they possess to make life comfortable; and it is only necessary to introduce immigration and it will increase, according as greater facilities and accommodation are offered to immigrants, by means of the opening of good roads to the populated places of the Sierra, and in all the extent of Peruvian territory.

And the advantage is, that these works do not conflict one with the other; all are indispensable for the aggrandisement of the country, and the day will come when all will be realised; but it is necessary that a beginning should be made in some direction, and the work be continued until completed, and this is what I have always advised the Amazon people to do, whose conduct is very laudable in this respect.

Hoping that your patriotic efforts will be crowned with the most complete success in the briefest time possible,
I am, &c.,

ANTONIO RAIMONDI.

MR. ARTHUR WERTHEMAN'S OPINION OF THE
AMAZONIAN PROVINCES.

*The following is a letter from MR. ARTHUR WERTHEMAN, the eminent German explorer, to DOCTOR ALBORNOZ, respecting the fertility of the Cahuapanas regions
Translated from "El Comercio," 6th July, 1887 :—*

CAHUAPANAS, TURICO, June 10th, 1887.

MY ESTEEMED FRIEND,—I received yesterday your letter, to which it is difficult to reply as I should wish, I having lost all my documents in the wreck of the *Valdirca*.

I remember that, in the month of September, 1878, when I descended the river Cahuapanas, we experienced a minimum depth of 1 mètre 20 centimètres, or 4 feet, which is more than sufficient for steam launches, and, in the other months of the year, it has a far greater volume of water. Its current, on an average, was four miles per hour.

Presuming that the navigation from Barranquita is difficult, this will not be an inconvenience, since from the town of Cahuapanas to Barranquita there are only three leagues of road in a north-west direction, and to the river Sillay, which is as voluminous as the Cahuapanas, four leagues distant. From the town of Cahuapanas to the confluence of the rivers Cahuapanas and Marañon there are also nine leagues of level road, and though for want of water the traffic is interrupted for a month in the summer period, this will not be of great importance, as it happens at that period the steamers of Brazil do not reach Iquitos on account of the sandbanks outside the port, which does not affect very much the trade of Iquitos, and much smaller places like Cahuapanas. For two months of the year the steamers only ascend the Huallaga, because the ordinary steamer Huallaga has sharp bends in its course.

The lands watered by the affluents of the Cahuapanas have great advantages as regards both climate and natural productions; the regions at the sources of the affluents are high and favourable for agriculture, and those of the pampas, partly flooded for three months of the year, contain much india-rubber, and are good for the cultivation of sarsaparilla, which even grows there spontaneously.

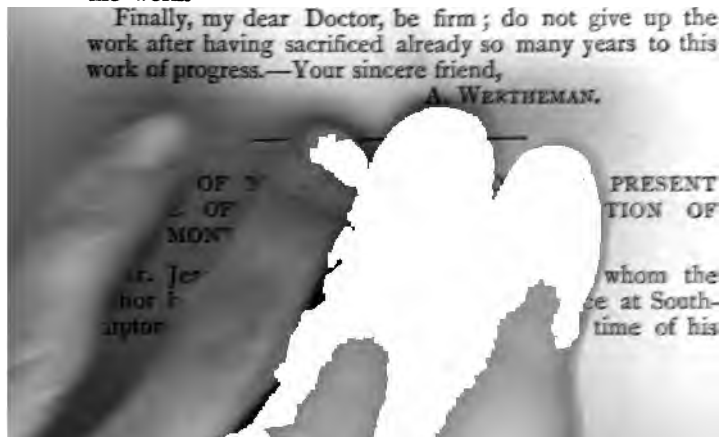
Sheep, which are so scarce in the whole Amazon valley, can be reared not far from Cahuapanas, since there is much land suitable for the purpose without being either cold or very warm. You must always remember, as I have told you, that in Peru the roads of vital importance are those from Cuzco to Urubamba, from Tarma and Chanchamayo to the Perene, from Huámico to Pozuzo and Pichis, from Pataz to the Huallaga, from Chachapoyas to Cahuapanas, from Moyobamba to Yurimaguas. One of these roads does not make the other unnecessary,—all are exceedingly indispensable.

To make a road from Cahuapanas to Chisquilla, I think it will be more easy to begin at the source of the Hunguyacu, where there are some valuable lands. When I was in the Hunguyacu there were some Aguarunas tribes whose services would be useful for the expedition.

You ought to have a map which I sent you some time ago. A copy will render much assistance to those who may make the expedition from Iquitos; and, with regard to the details of the organisation of the expedition, they are very simple, and we have spoken sufficiently about them; it is necessary to form it of the forest people accustomed to the work.

Finally, my dear Doctor, be firm; do not give up the work after having sacrificed already so many years to this work of progress.—Your sincere friend,

A. WERTHEMAN.



re-embarkation for Peru, gave him the following information, which he gives in his own words :—

I have lived fifteen years at Cajamarca and in the Amazon provinces. The country is exceedingly healthy. I have never experienced any illness whatever. I embark to-day, with eight other engineers, to develop the mines and erect smelting-works near Cajamarca, the private enterprise of Herr Hilbeck, the consul-general of Germany in Peru. There is a wide field of enterprise for companies and capitalists. In the neighbourhood of Cajamarca there are extensive silver and copper mines, only partially worked. They are more particularly favourable for smelting than for amalgamation, as the ores contain a mixture of silver, copper, and lead. Within a distance of four miles coal is found in abundance, but, however, is not worked, from the fact of there being no direct means of transporting it to the coast. The country produces wool, sugar-cane, cocoa, coca, sheep, vicuñas, horses, llamas, &c. These animals are reared in great numbers in the district.

Colonisation of the Montaña.—With regard to this subject Mr. Nötzli says :—The fluvial departments of Loreto and the Amazons are the most favourable for colonisation in the event of the fluvial navigation of the Amazon being extended up to the rapids of the Pongo of Manseriche. The places more particularly suitable for the establishing of young colonies are near the rivers, where the produce can be easily transported to where there is a market ; otherwise, if established inland, where there are no roads, there are no means of transport.

Bongara as suitable for Colonisation.—I consider the province of Bongara, forming part of the Amazon Department, is more particularly favourable for the establishment of a young colony, on account of the immensely rich products already accumulated there, such as coffee, cocoa, coca, and valuable woods, all of which can be exported at once by the facilities which the rivers afford for their transport. Moreover, the soil is very fertile, and, with a little labour, can be cultivated. In the immediate neighbourhood there are uplands, where the colonists can cultivate potatoes, wheat, and other cereals. I have had great experience in navigating the rivers, and have

frequently been brought into contact with the Indians, who, although savages, are not dangerous, and have never molested me.

REPORT OF MR. OTTO RINGELING.

On the 7th April, 1887, the author had the pleasure of meeting Mr. Otto Ringeling, previous to his embarking from this port (Southampton) for Peru, who very kindly supplied him with the following information of his experience of Peru, which is given in his own words :—

I have been fourteen years resident in Peru, and have had occasion to know the interior—viz., the Sierra as well as the Montaña. As far as climate is concerned, no doubt the Sierra would be preferable to English and German colonists, on account of its similarity to their own countries ; but this part of Peru is poor compared with the immense fertility of the Montaña, where the richest products can easily be cultivated, such as coffee, sugar, tobacco, &c. Not the least of the rich productions of the Montaña consists in all sorts of splendid kinds of woods. In the colony of Chanchamayo, carpenters who were engaged there on behalf of the Government found woods of fourteen different colours, all of a superior quality, the cedar being the poorest and most common kind. These woods would replace with great advantage the finest descriptions now in use in Europe. Any part of the eastward slope of the Cordillera towards the Amazons would be a fit place for European immigration, so soon as that part of the country is put in connexion with the coast by rail, or with the Atlantic by means of fluvial navigation down the Amazons ; but, until this is done, all attempts at colonisation will be of little success, as is shown by the colonies of Chanchamayo and Pozuzo. Chanchamayo can no longer be considered a colony, but the work done by the colonists exists, and has been carried on by capitalists, who have bought the colonists out and have formed large haciendas of their lands, which are now cultivated by them on a large scale. I will explain how this happens :—The capitalists can cultivate these lands more extensively, applying them to the growing of crops of coffee, &c., which they can transport

to the Sierra or the coast, whereas the poor man has not the means of doing so, and therefore is compelled to dispose of his crop on the spot whenever an opportunity occurs for him to do so.

The colony of Pozuzo still exists. It consists of Tyrolese, who some twenty-five years ago settled in that part of the country, and have ever since cultivated it. They remain there cut off entirely from the civilised world ; they earn enough for their own living, and, in fact, live well and are in good health ; but they have not the means of making themselves a prosperous colony on account of want of communication and a market for their produce. No one ever interferes with them. They have their own church and schools, and live happily and contentedly together, cultivating crops of tobacco, coffee, fruit, and vegetables, and rearing horses, mules, cows, fowls, &c., for their own use ; but as soon as communication by good roads, railways, and navigation is established, then, of course, everything will take another turn.

The want of Irrigation.—In the north of Peru there are extensive deserts of very fertile soil, which only want irrigation to allow the cultivation of any of the tropical plants, such as cotton, coffee, sugar-cane, tobacco, &c. The idea of irrigating these deserts from the rivers existing on the mountains has been brought to the notice of the Peruvian Government on previous occasions, but no efforts have as yet been made to carry out so important a work, although it could easily be done in the event of capital being found to execute it.

Mines.—Peru is provided with silver and gold-mines to a very great extent. Silver-mines are to be found on the western side of the Cordillera, especially on the higher part of the mountains ; they lie, therefore, in the Sierra. A great many people are proprietors of silver-mines, and daily new mines are discovered, but, up till now, only a small number of them are worked, chiefly for want of labourers, and on account of their being situated in barren places in the mountains, far from towns and habitations. Nevertheless, the mining enterprise promises at the present moment to be one of the chief resources of Peru. Rich gold-mines exist on the eastern side of the Cordillera, and

in the valley of Carabaya, and in the Union province,¹ as the streams flowing down the Andes bring down quantities of gold which can be easily washed out, but up to the present time very few gold-mines have been opened up for want of capital and scientific labour. Any man working earnestly and soberly, and conducting himself as a good citizen, will prosper in Peru, in due time, whenever the above-mentioned improvements are carried out; and it ought to be the special care of the Peruvian Government to provide such facilities, as well as to take proper steps to guarantee the interests and protect in every way European immigrants to these parts of Peru.

THE REPORT OF MR. J. D. OSMERS, BOTANIST, ON
THE MONTAÑA.

SAFETY AMONGST THE INDIANS. THEIR WILLINGNESS
TO WORK.

The author had the pleasure of meeting the above distinguished botanist on the 13th of April, 1887, on his arrival at Southampton from the Brazils, who supplied him with the following information:—

Mr. Osmers said:—I visited the Amazon regions of Peru in November, 1883 arriving at Yurrimaguas, on the river Huallaga, on the 11th of that month. I engaged four mules and three men and set out in search of orchids. I was six months travelling about the forests amongst the tribes of Indians, and I can safely say that I was never molested in the least by any of them; but, on the contrary, I found the Indians to work well, and very ready to assist me in bringing down my cases of plants. With regard to the suitability of these parts for English and German colonisation, my opinion is that much would not, on account of the low swampy parts, be suitable, but the high lands of the eastern slope of the Cordilleras would undoubtedly be very suitable and healthy, on account of the climate being so much like England and my own country, as soon as communication from thence is opened up with the coast and to the fluvial navigation of the Amazons.

¹ The principal mines being the Huayllura, Palmaderas, and Montes Claros.

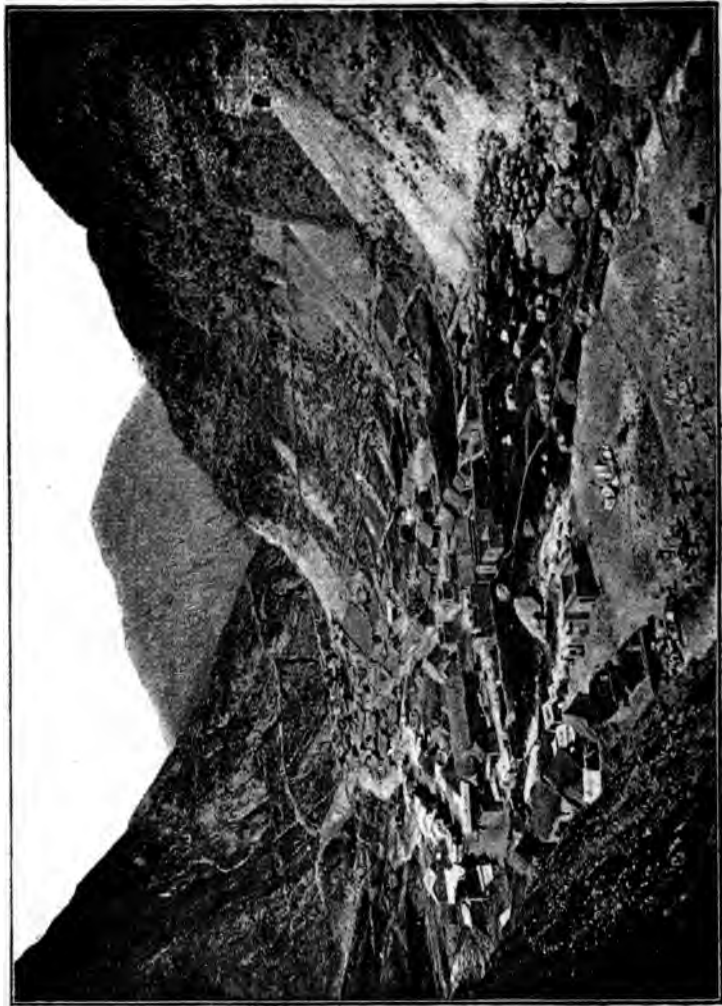
CLIMATE.—PROSPECTS FOR CAPITALISTS.—
HOSPITALITY.

ACCOUNT OF A VISIT TO PERU BY A BRITISH NAVAL OFFICER.

An English naval officer, who has lately served four years on the Pacific station, has kindly favoured the author with a description of his visit there. After describing the various engineering difficulties that have been overcome in the construction of the railways through this mountainous country, he proceeds to give the following particulars as to the capabilities of the country :—

The most is made of irrigation, but in a very rude way, as in the Rimac valley, where tremendous crops of sugar-cane are raised. I am sorry I have no figures, but these could be easily obtained. I only know that the produce per acre from land where irrigation is carried out, such as the Chimbote and Rimac valleys, far surpasses that produced in the most favoured regions of any other part of the world. Here, I think, is a great opening for capitalists, a sugar estate here being a sure means of obtaining a very speedy return of very large profit. The climate is all that can be desired, being dry and warm, and so equable that one crop of cane after the other can be cut, so that the sugar-mills can be kept constantly running, not remaining idle for ten or eleven months in the year, as in the West Indies. In fact, there is no line to be drawn for the seasons, as you experience but one perpetual summer, so that a constant supply is always obtainable. This is carried on without the land requiring to be fertilised or to lay idle. This is due to the large quantities of nitrates in the soil. There are many large sugar estates in the north of Peru; one, that of Señor Dertiano, about ten miles inland from Chimbote, I visited. Here we were shown the greatest civility, and hospitality of a very high order, horses being placed at our disposal to visit the various parts of the estate; and although we were utter strangers to this gentleman, yet pressing invitations were given to the whole party to remain.

Maize is also grown in great quantities; it forms the chief food of the poor Indians (the Cholos), who are descendants of the old Peruvians. Another trip I made



CHICLA, PRESENT TERMINATION OF THE OROYA RAILROAD.

See page 81.

from Mollendo to Puno, on the Lake of Titicaca, visiting Arequipa on the road.

In speaking of the hospitality shown him in the south on occasion of a visit to Lake Titicaca, he says :—Here, if possible, it surpassed that shown us in the north, a train was placed at our disposal from Arequipa to Puno, horses were always waiting for us, and it was with difficulty that we were allowed to pay our hotel bills; and this hospitality was from people we had never seen before, and most probably would never see again, and without a chance of in any way returning their kindness. I cannot pass by Lake Titicaca without saying a word or two on the wonderful quantities of wild fowl here. Officers who had been in all parts of the world said they had never seen a hundredth part of the fowl we saw here; they literally rose in thousands upon thousands. Geese, swans, and ducks of all kinds were found here in the greatest profusion. It is the Paradise of the sportsman; the plains round about the lake teem with guanuco and vicuña. Here also is the home of the llama. A cross between the llama and the vicuña produces the fine valuable wool so much sought after by our manufacturers for weaving into a fine soft cloth. This animal flourishes here, and I have no doubt that the breeding of it would prove most lucrative. I know of no more promising field for mining adventure than Peru. When I was in Chicla I saw scores of llamas coming down the mountains with silver ore on their backs, and this obtained by the montaneros (Indians), with the most primitive tools. From the best authority I heard the most glowing accounts of the richness of the silver mines.

THE EXPLORATION AND COLONISATION SOCIETY
OF THE AMAZON PROVINCES OF PERU.

*Nomination of a Commission by the Prefect of Cajamarca.
Translated from "El Callao," 22nd October, 1886.*

OPENING OF A ROAD TO THE CAHUAPANAS.

The Prefect of the Department of Cajamarca, Señor Frederic Rios, being convinced that the progress of the country depends upon the quick realisation of a road which

will connect the capital of the Department of the Amazons with the navigable waters of the Cahuapanas, thus affording a short road to the Atlantic, and so receive the enlightened industrial population of the old world, has undertaken with enthusiasm and patriotism the duty of collecting funds in his Department in order to contribute to the execution of the respective works for that object.

To carry out his intention the Prefect has nominated a commission composed of Señor Luis F. Bustamante, who will be President, Señores Carlos Beckerel and D. Wenceslas Villacorta. These gentlemen will arrange the carrying out of this important work with Dr. José Arbaiza, who is the delegate in this Department of the Society.

Translated from "El Callao," 21st March, 1887.

LIST OF SUBSCRIPTIONS.

The Council of Delegates, in its last session, notified the receipt, from Dr. Albornoz, of the following amounts from the undermentioned delegates of the Society :—

From the delegate at Huamachuco	\$46.50
„ Señor Manuel Pinillos Marten	40.00
„ the council of the Santiago de Chuco district.	6.00
„ Luis Enriquez	80
„ the delegate of the province of Moquegua ...	149.40
„ „ Arequipa	151.40
„ Provincial Council of Condesuyos.....	20.00
„ the Sub-Prefect of the same province	19.40
„ Provincial Council of Castilla.....	12.00
„ the delegate in the province of Cauta	525.00
„ the Sub-Prefect of same	200.00
„ the delegate of the Huanuco department	175.00

\$1,345.50
(= £269. 2s.)

It was arranged that in the absence of Dr. Solar, Dr. Zurate, or in his absence Señor Elguesa, would preside at the regular meetings of the Society, and a vote of thanks was accorded to Dr. Albornoz for his efforts in promoting the objects of the Society.

APPOINTMENT OF THE AUTHOR AS DELEGATE MEMBER OF
THE SOCIETY FOR THE EXPLORATION AND COLONISA-
TION OF THE AMAZON PROVINCES OF PERU.

This eminent Society elected the author of this work as honorary member and its delegate in England, by a diploma dated Lima, 9th July, 1887.

The object of the Society has already been recorded, viz., that of preparing the Amazon regions of Peru for European colonisation, and so opening the same to the advantages of civilisation and Christianity, for which purpose the Society seeks the co-operation of capitalists and people of this great country in joining hands with it to carry out this noble work.

As an Englishman, and one who has during the period of sixteen years received repeated courtesies at the hands of the Government of Peru and its people, the author will gladly contribute his humble services towards this laudable and patriotic work, which he trusts will be a blessing to the two peoples, on the one hand by opening up the dark regions of Peru to civilisation, and on the other by giving means of employment to those in distress in Great Britain and Ireland.

At all times he will have pleasure in affording information upon the subject in his power to persons requiring the same, and offers his services as a medium between such persons and the Peruvian Society.

NECESSITY FOR ASSISTED EMIGRATION.

The urgency which exists in this country for assisted emigration is acknowledged by all Englishmen who desire their country's progress, and hold the welfare of their fellow-men at heart. A Society called the National Association of State-directed Colonisation has been formed, with the object of assisting intending emigrants. So far, no measures have been taken in that direction by the State, but it is evident that the legislature of this country is fully alive to the deep importance of the question, as is evi-

denced by the reply given by the Prime Minister to a deputation headed by Lord Brabazon at his official residence, on Feb. 24, 1887, when Lord Salisbury, in the course of his reply, said :—

“It is one of the most momentous subjects with which the present generation can deal. I feel intensely that if we go on as we are going now, and there is no *machinery* for leading out into less exhausted and less crowded portions of the world the vast population, we are only adding to our roll a terrible amount of misery, which must be discharged by this or the next succeeding generation. It is impossible to exaggerate the importance, taking it in a large sense, of the subject that you have brought before me.”

Sir Theodore Martin, in a letter to Lord Brabazon upon this subject, writes :—

“It is one in which I have for many years felt the deepest interest, my conviction having long been, that the problem how to deal with our surplus population is one which, if not earnestly grappled with by the Government, as well as by individuals, will force itself upon our consideration in ways that cannot be contemplated without alarm. It is obvious that we have already more mouths to feed in England than can be fed out of the wages fund, which during the years of ‘leaps and bounds’ of prosperity was ample for the purpose. And these mouths are increasing yearly, with a rapidity that is simply appalling. Other countries, where the pressure of population is not so great (more far-seeing than our own), are, with the assistance of their Governments, pushing their commerce into regions where we formerly enjoyed almost a monopoly, and so narrowing day by day the resources of our own commerce. They, too, see the importance of obtaining possessions to which their own surplus population can be sent, and in time establishing markets for their home products, and so providing wages for their home populations. . . . We have a vast population on our hands ready to work, but with no work for them, nor the means to transport themselves to the regions which are ours, and where all the industrious workers we can spare might in a very brief period establish themselves in comfort, and open invaluable markets for the products of our native industries.”

HOW TO EFFECTUALLY COLONISE THE AMAZON REGIONS
AND EASTERN SLOPES OF THE ANDES OF PERU.

It is the author's opinion that the first step to be taken to effect the colonisation of these rich and fertile regions is to form a Railroad Company, which would receive important concessions of land from the Peruvian Government, similar to what has been done in the Argentine Republic, and which has been attended with such magnificent results that the railroads in that country are now amongst the most remunerative of any in the world.

Experience has shown us that in all new countries the pioneer to colonisation, commerce, and civilisation, is the railroad. We have only to observe the immense flow of emigration which is daily taking place to the Argentine Republic, in consequence of the great lines of railroad which have been made there, and which are now being extended to the borders of Bolivia. Vast plains which were only very recently uninhabited deserts are now studded with flourishing towns, populated by Europeans.

The President of the Peruvian Exploration and Colonisation Society points out, in his report given in a previous chapter, the facility with which a line of railway may be constructed, and if the lines of railway in the Argentine Republic have proved so highly remunerative, surely it may be confidently expected that similar undertakings in these fertile regions would be attended with equally good results.

It is to be hoped that capitalists in this country will avail themselves of the opportunity to initiate this important work in one of the richest quarters of the globe, which will be the means of opening up a new and extensive field for English enterprise and colonisation.

CHAPTER VI.

Railroads.

THE following are the Government Railroads:—

Name of Railroad.	Length in English Miles.	Cost in £ Sterling.	Remarks.
Callao, Oroya and Cerro de Pasco	136	5,175,000	{ Finished to Chicla.
Mollendo and Arequipa ...	107	2,250,000	
Arequipa and Puno	218	6,000,000	
Puno, Juliaca, and Cuzco...	82	4,500,000	
Ilo and Moquegua.....	63	1,256,250	
Pacasmayo, Guadalupe, Yonan, and Cajamarca	83	1,331,250	
Pisco and Ica.....	45	300,000	
Ancon and Chancay	45	60,000	
Lima to Huacho	89½	750,000	
Payta Piura	63	337,500	
Lima to Pisco	144	1,875,000	
Huacho to Suya.....	36	450,000	
Chimbote, Huaraz, and Recuay	172	4,500,000	
Salaverry to Trujillo and Ascope	40	600,000	
Total.....	1,323½	£29,385,000	

760 miles are furnished and equipped, and for the present it is proposed to construct the most important sections, such as Cerro de Pasco, part of Cuzco, and part of Chimbote railroads, in all about 240 miles. The Ilo road was destroyed, and the rails and rolling stock carried off by the Chilian forces.

PRIVATE RAILROADS.

	Miles.	Cost.
Cerro de Pasco (Mineral Railroad)	15	
Iquique to Noria	37	
Pisagua to Sal de Obispo.....	35	
Eten to Ferrenape	28	
	<hr/> 115	

RAILWAYS ALREADY WORKING (ENGLISH COMPANIES).

Arica to Tacna	39½	} £1,125,000
Callao to Lima	9	
Lima to Chorillos	9	
	<hr/> 57½	

Professor Orton, speaking of the Railroads, says :—
 “Peru has just found out that this is an age of roads, and that if she would not fall too far behind in the race of nations she must have means of inter-communication. No other country has greater need of highways, for the two agricultural regions, the Interandean plateau and the eastern Transandean slope (Montaña) are separated by the Oriental Cordillera, and the mineral region is cut off from the agricultural by the coast range, while no navigable streams enter the Pacific. The Incas constructed some remarkable roads, chiefly longitudinal, one passing over the grand plateau from Quito to Cuzco; another along the coast. The latter is almost effaced by the shifting sands; a fragment, however, is still visible at Pacasmayo. The remains of the other bear evidence of their primitive grandeur, and have drawn forth the eulogium of Humboldt, that ‘the roads of the Incas were among the most useful and stupendous works ever executed by man.’ But these roads are now useless, and, even if repaired, would be unsuited to modern commerce. What Peru wants, and what she is trying to accomplish, is the introduction of a system of transverse railways, bringing her rich highland valleys in connexion with her ports, and a longitudinal line eclipsing the royal road of the Incas, which shall link all together, passing from Jaen through Cajamarca, Cerro de Pasco, and Cuzco, to the Lake Titicaca.”

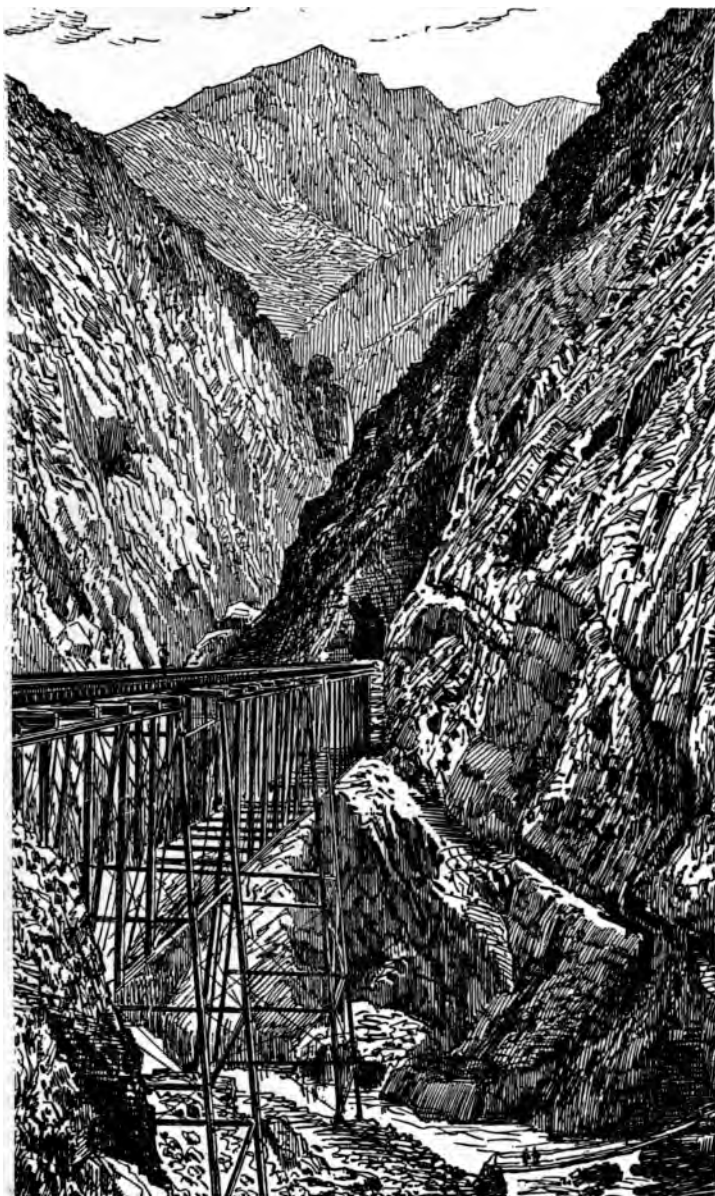
"The following railways are owned by private companies: Lima to Callao, eight to nine miles, finished. This is the oldest road in Peru, having been opened in 1851, and, like all the rest, it has but one track. Lima and Chorillos, the fashionable Long Branch of Peru, nine miles, finished. Eten and Lambeyeque, twenty-eight miles, finished, starting from an iron pier 4,000 feet long. Arica and Tacna, forty miles, finished. A continuation to La Paz is projected, to cost \$32,000,000, to rise 14,000 feet; this would be the nearest outlet for Bolivia, but would have a rival in the Arequipa and Puno road. Iquique and Pisagua, 160 miles, half finished, designed only for the exportation of nitrate of soda. There are also short roads constructed at Pimentel, Trujillo to Ascope, Patillos, Eten, Lambeyeque, and from Magdalena to Lima. These lines represent \$25,000,000."

"Peru has invested about \$140,000,000 in railways—a gigantic sum for 3,000,000 of people; but guano is the exchequer. Of this amount she has paid nearly one-half, and 650 miles of track have been laid, or one-half the projected amount. It costs 50 per cent. more to build a railway in Peru than in the United States, for everything must be imported, and labour is expensive.¹ Among the minor roads owned by the Government are the Pisco and Yca, forty-five miles, finished, cost \$1,500,000. Ancón, finished from Lima to Chancay, forty-five miles, cost about \$300,000. Payta and Piura, sixty-three miles, a portion of which is still in construction, to cost \$1,950,000."²

"But all the great iron roads of the Republic are the handiwork of Mr. Meiggs, the ablest representative of American enterprise south of the Equator. Mr. Meiggs has contracts with the Government amounting to \$133,000,000 for building seven railways, with an aggregate length of about

¹ Ilo to Moquegua was carried away during the war, but is to be rebuilt shortly. The concession to build a railroad from Lima to Pisco (144 miles) was granted in February, 1887, while a short time ago an English firm was carrying on negotiations with the Government to build the same, besides a narrow gauge one from Pisco to Ayacucho.

² The mountainous nature of the country requires enormous engineering work, chiefly in cutting and tunnelling. Besides, the gradients are so steep that Peru possesses the highest and steepest railroads in the world.



**LARGE CAST-IRON BRIDGE OF THE OROYA RAILWAY, AND THE OLD
SUSPENSION BRIDGE OF VEGETABLE FIBRE.**

Face p. 8

1

a thousand miles. Five of these are finished ; three (the Puno, Oroya, and Pacasmayo), the longest and most difficult, being in process of construction at the same time."

"The gauge of the roads is 4 feet $8\frac{1}{2}$ inches, save that of Chimbote, which is 3 feet. The rolling stock is American, the cars coming from Gilbert, Bush & Co., Troy, and locomotives (mostly Rogers's) from Paterson. A locomotive on the track costs \$20,000, to \$25,000, and a first-class car \$5,500.¹ The ties are from Oregon, the rails from England, the diamond drills from America, worked by Rand & Waring's compressor ; the stationary machinery from Leeds. The shops and depôts generally are made of English galvanised iron, the shovels are Ames's, and the iron water-tanks Pill's Patent. The engineers are invariably, I believe, English-speaking, and the labourers are Chinese, Cholos, and Chilians. The timber, iron, rolling stock, labour, fuel, and nearly all the food are imported."

"It will be a long time before the Government will realise anything directly from these railroads. The Chimbote, passing through a developed mining region, and the Ilo, draining the vineyards of Moquehua, will soon be self-supporting. But such a costly enterprise as the Oroya can do nothing but expend until it is extended to the Amazons ; while as to the Arequipa, one is in doubt whether to wonder most at the skill of the engineers or the hardihood of the Government in ordering the gigantic undertaking ; for it passes through an utterly profitless region—one village in one hundred miles—over sterile pampas and black paramos, without mines worth the working, without a sign of life, save now and then a condor, a few herds of Peruvian sheep, and scattered tufts of wiry grass, cacti, and *compositæ*. The great export from Southern Peru, alpaca, does not exceed 10,000 quintals a year. Surely, we say, the Government will not have a month's work for this road in a year. But so would we misjudge the Pacific Railroad, as it crosses the great desert. When the Oroya Railroad joins the Pichis river, and the Arequipa is connected with the heart of Bolivia, and thence

¹ The Government has been charged \$30,000 for most of the locomotives.

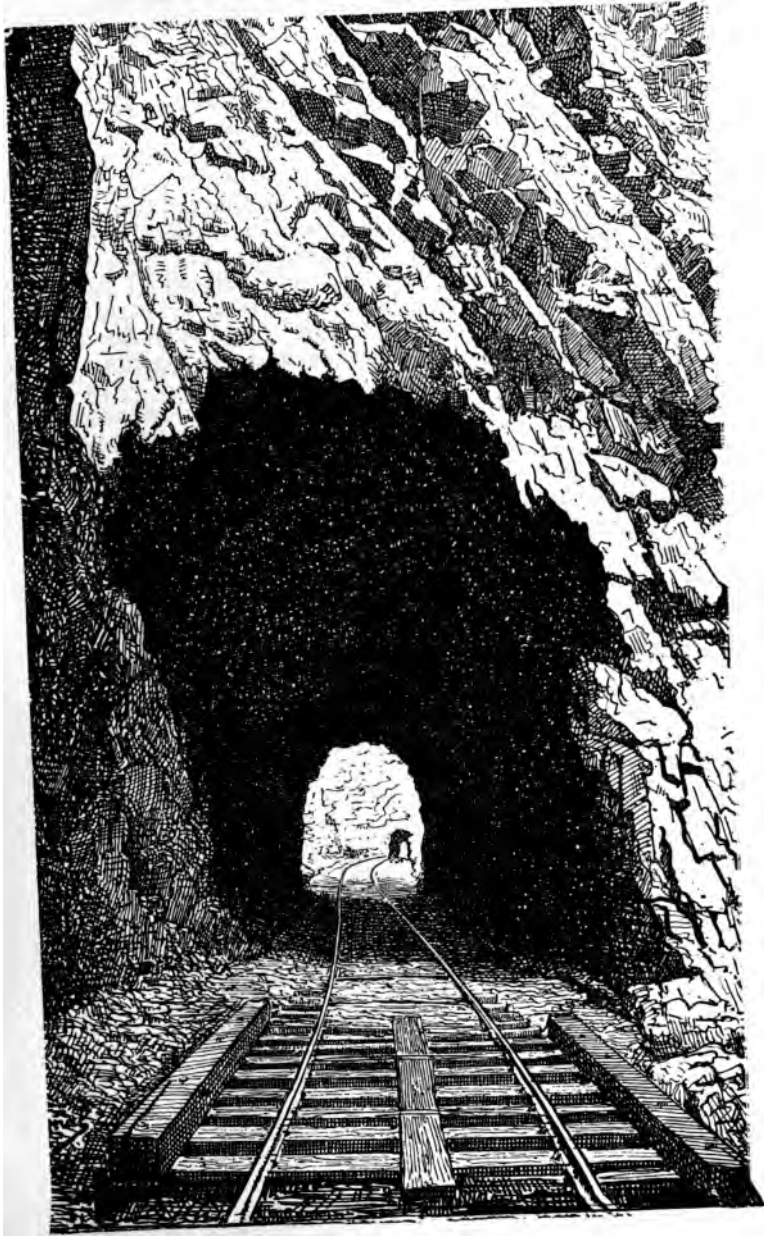
with the projected lines in the Argentine Confederation, we shall look for dividends. The railroads of Peru, as everywhere else, will develop new life in the people, and new sources of wealth in the country."

"But, letting Peru look after the proceeds, let us glance at these great enterprises as marvels of engineering, and as the creations of American genius."

"*The Pacasmayo Railroad*—situated in lat. $7^{\circ} 30'$ S. Termini—Pacasmayo and La Viña. Length, 172 miles, finished. Contract taken by Mr. Meiggs at \$5,800,000 in cash. Starting with an iron mole half a mile long, it passes up the valley of Rio Jequetepeque (or "Hidden River") through the village of San Pedro, the capital of a rich agricultural region, having vast plantations of sugar-cane, rice, coffee, and corn; then over a desert, which, however, can be easily reclaimed by irrigation, and ends at an altitude of 4,000 feet, near the silver mines of Chilte. A branch leads to the busy village of Guadalupe. One can now go from the coast to Cajamarca in a short time."

"*The Chimbote Railroad*..—Situated in lat. 9° . Termini—Chimbote and Huaraz. Length, 172 miles, finished. Contract taken by Mr. Meiggs, at \$24,000,000 in cash. It passes up the valley of the Santa, and then southerly along the highlands, and is designed to open up the rich mines of that region, and to benefit 200,000 inhabitants. It begins with a magnificent iron pier, and there are thirty tunnels on the route."

"*The Oroya Railroad*..—Situated in lat. 12° . Termini—Callao and Oroya. Length, 136 miles. Contract taken by Mr. Meiggs, at \$27,600,000, in bonds at 79. This is one of the Nine Wonders in the Peruvian world, and certainly it is the greatest feat of railroad engineering in either hemisphere. As a specimen of American enterprise and American workmanship it suffers nothing by comparison. It was begun in 1870 and finished in 1876. Starting from the sea, it ascends the narrow valley of the once sacred Rimac, rising the first forty-six miles nearly 5,000 feet; then it threads the increasingly-intricate gorges of the Sierras (a winding, giddy pathway along the edge of precipices and over bridges that seem suspended in the air), tunnels the Andes at the altitude of 15,645 feet—the most



TUNNEL ON THE OROYA RAILWAY.

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elevated spot in the world where a piston-rod is moved by steam—and ends at Oroya, 12,178 feet above the Pacific. The wonder is doubled by remembering that this great elevation is reached in seventy-eight miles. Between the coast and the summit there is not an inch of down-grade. The difficulties encountered in its construction are without a parallel. The valley narrows to a ravine, and then to a gorge, till the closing in fairly overhangs the infant Rimac; in fact, at one point a stone dropped will fall on the opposite side of the stream. So that, in forcing the railway up the Cordilleras, the engineers have literally threaded the mountains by a series of sixty-three tunnels, whose aggregate length is 21,000 feet. The great tunnel of Galera, by which the locomotive is to be taken over the Andes, will be 3,800 feet long. Besides boring the flinty rock, and making enormous bridges, cuts, and fills, the workmen (of whom 8,000 have been engaged at one time) have had to contend against land-slides, falling boulders, sorroche (or the difficulty of breathing at high altitudes), the extremes of climate, pestilential diseases, such as fevers and verrugas, and accidents by falling from the rocks and in blasting. Over 7,000 have died or been killed in the construction of this road. The bridges and crossings number over thirty. All are of iron or stone. Some are of French and English manufacture, but the best are American. Of these the Verrugas bridge is the most remarkable structure of its kind in the world. It spans a chasm 580 feet wide, and rests on three piers. The base of the middle pier is 50 feet square, and its height is 252 feet. The deflection is only five-eighths of an inch. It was made at Phoenixville, Pa., of hollow wrought-iron columns, and cost in New York \$63,000. This triumph of American ingenuity is the great attraction in Peru, and is the wonder and praise of all visitors. The maximum grade of this road is 4 per cent., the sharpest curve 395 feet radius, and the average consumption of coal sixty-five pounds per mile. Mules and gunpowder are indispensable in advance of the locomotive, and together make quite an item; \$115,000 are invested in the quadruple means of transportation, and 500,000 pounds of powder are used monthly for blasting. My fearfully grand ride down the Andes on a hand-car drawn by gravity, under

the superintendence of Mr. Cilley, will never fade from my memory. To fly along the edge of a precipice at the rate of forty-five miles an hour, and whip round a curve till every hair of the head stands on an end, is glorious—when over. Once is enough for a lifetime. Oroya, the terminus, is only a point of divergence.¹ In time, branches will run to silvery Cerro de Pasco, to Tarma, destined to be the Mecca of consumptives, and to Fort San Ramon or to Mairo, the head of navigation on the Amazons. This will probably be the first inter-oceanic road in South America, as the link necessary to connect it with the great river is very short. It will also serve to colonise and civilise the mountain regions of Peru."

"*The Arequipa Railroad*.—Situated in lat. 17°. Termini—Mollendo and Arequipa. Length, 107 miles, finished. Contract taken by Mr. Meiggs, at \$12,000,000 cash. Commenced in 1868, completed in 1870."

"*The Puno Railroad*.—Situated in lat. 16° 30'. Termini—Arequipa and Puno, on the west shore of Lake Titicaca.² Length, 218 miles, finished. Contract taken by Mr. Meiggs, at \$32,000,000, in bonds at 79. Commenced July, 1870, completed June, 1874. These two roads—the Arequipa and Puno—are practically one (for it is a continuous line), and may be treated together. At present this is the longest railway south of the Equator, unless the Rosario and Cordova railroad be a rival. It is the most lofty and most serpentine railway in operation anywhere, and no other road in the world can show so much heavy work done. On the first division 7,000,000 cubic yards were removed. The deepest cut is 90 feet, the highest fill 112 feet; powder used, 27,000 quintals. On the second division the total amount of excavation was 9,858,000 cubic yards, the deepest cut being 127 feet (260,000 yards), the highest fill 141 feet; powder used, 15,500 quintals.

¹ A contract has been signed since 1885 to finish this road beyond Oroya to Cerro de Pasco, the most wealthy silver mine in South America after Potosi.

² The Lake Titicaca is 13,000 feet above the level of the sea, the highest navigation in the world, and it has a depth of sixty fathoms of water. The Peruvian Government have steamers plying between Puno and the Bolivian ports on the other side of the lake conveying passengers and merchandise.

There is but one short tunnel in the 325 miles, although the first survey of the Arequipa division alone demanded nineteen. There are only four bridges, all American, the longest being 1,690 feet. The engines on the Arequipa division have 18-inch cylinders; on the Puno 17-inch. They consume one ton of coal (costing \$30) every thirty-four miles, and the shoes of the brakes are replaced for every round trip. The maximum grade is 4 per cent., and the maximum freight is sixty tons. The road crosses the high Andes at an altitude of 14,660 feet 116 miles east of Arequipa, where there is a cut of only 6'07 feet. When the track was laid beyond this summit, in 1873, it was the first time in history that a locomotive crossed the Andes. The Oroya railroad excels this in difficulty of work, in amount of excavation, as also, perhaps, in the sufferings of the men arising from want of food and fuel, and the prevalence of rain, snow, cold, and rarefied air. On both there was trouble in cooking certain articles of food, as beans for example, for the water boiled before it was fairly hot, so that the men were obliged to use closed cans to cook, under pressure. But there is this gain with the locomotives—the steam is generated and acts more freely at high altitudes, and less fuel is needed. A telegraph line follows each of these railroads. To supply Mollendo with water, a pipe has just been laid alongside of the track, eighty-five miles in length, the longest iron aqueduct in the world. It starts near Arequipa, at the elevation of 7,000 feet, and crosses the great desert of Islay. It is an 8-inch pipe, and discharges 433,000 gallons in twenty-four hours. It cost \$20,000 per mile. This magnificent highway across the Andes will be a dead loss to Peru unless extended, as it passes through the most useless region in the world; and Puno is but a huddle of 5,000 shivering Indians. A railroad from Puno to La Paz could be built for \$10,000,000. But one important tributary is already in course of construction."

"*The Cuzco Railroad.*—This first longitudinal road along the Peruvian Andes is to connect the city of Cuzco with the Arequipa railroad at Juliaca, near Puno. Length, 210 miles; graded contract, taken by Mr. Meiggs, at \$25,000,000 cash. The highest point, 14,150 feet, is about

100 miles north of Juliaca ; thence, for 90 miles, the track falls to 10,000 feet, following an affluent of the Ucayali, and then rises to Cuzco, which is 11,500 feet. It passes mainly through sandstone and limestone, but there is no tunneling. The total amount of excavation was 5,500,000 cubic yards. But the freight on the material for this road would be sufficient to build it in the United States. The productions for exportation are—cacao, coffee, wool, cotton, sugar, cascarilla, and woods.”

“*The Moquegua Railroad.*—Situated in lat. 17° 30'. Termini—Ilo and Moquegua. Length, 63 miles, finished. Contract, taken by Mr. Meiggs, at \$6,700,000 in bonds at 75. It passes through one of the richest wine-producing districts in Peru.”

CHAPTER VII.

The Sierra or Mountain Districts.

CONDITION OF THE PROVINCE OF JUNIN (CENTRAL PERU).

The following is an extract translated from a Report of the Prefect, SEÑOR PATRON, dated 29th May, 1886. From "El Peruano."

THE MINING INDUSTRY AT CERRO DE PASCO.

THE Prefect reports :—"The mining industry of this Department has commenced to revive. The rich mines at Cerro de Pasco, the gigantic resources of which seemed to have been expended, are again worked with considerable activity. Formerly, the annual product of these mines amounted to \$8,000,000, or £1,600,000. During the past months, its production, notwithstanding the difficulty of procuring labour and the wet season, has increased very considerably. However, as long as there is no change made in the system of mining from the ancient and primitive style to that which modern science teaches to be the best, the mines will be incapable of showing a real national wealth. The Government and Congress should take care that this is done. From its realisation, this colossal mine would open quickly its inexhaustible and rich veins, spreading throughout Peru the fabulous riches it contains; and in order that such a happy state of things may be realised it is necessary that the great work of the Transandean Oroya railway be brought to a speedy termination. Important works are being carried

on at the famous Yauli mines. An experienced engineer is directing them who is sanguine of the most brilliant results. Yauli, in its granite rocks, holds out another future source of wealth to the country; and is within thirty miles of the present terminus of the Callao and Oroya Railway. A large staff of scientific American engineers have lately been engaged by an American syndicate of capitalists, surveying at the Cerro de Pasco Mines. Their report is not yet issued, but it is known to be highly favourable."

AGRICULTURAL INDUSTRY IN THE JUNIN DEPARTMENT.

"Providence has dispensed to the Department some compensation for its long sufferings caused by the war. The crops this year are superior to those of the last seven years, and offer abundant grain of all kinds. The various grasses which cover the country, fertilised by the abundant and extraordinary rains, supply our flocks of sheep, vicuña, and llama with a rich and varied sustenance. The entirely primitive style in which our agriculture is carried on cannot produce those benefits that it is capable of producing. We have now a scientific agriculturist, who will introduce the most useful crops to be cultivated, which will stimulate our rude peasants, and teach them the advantages to be derived from being led by what science teaches, compared with the rude system they adopt."

ROADMAKING IN THE FORESTS.

"If the mining industry offers an immediate and rich future to Peru, how much greater and surer do the rich, fertile regions of the Amazon offer with infinitely greater resources? In the vicinity of Tarma sixteen leagues of the forest country are already populated and traversed by a horse-road, offering a safe and convenient road for travellers and produce. Another fifteen leagues of road have to be made in order to reach localities on the rivers from which there are convenient ports of departure for steamers. In six days a person can make a journey from the shores of the Pacific Ocean to the beautiful regions of the Mairo, Pichis, and Palcazu."

MANUFACTURES.

In the provinces of Jauja and Huancayo, there has always been noticed an inclination to engage in manufacturing pursuits. This industry has suffered natural paralysation in the last few years, but it is to be hoped, tranquillity being restored, it will again take that importance it formerly occupied. In the provinces of Tarma there is a small town, Cacas, which is almost exclusively dedicated to the making of woollen cloths, in which it enjoys a profitable occupation.

CERRO DE LA SAL (HILL OF SALT).

It would be indisputably convenient to occupy this important place, the key by which we will easily be able to open the road that will give us a wide and free passage to the beautiful Amazon regions.

Numerous tribes of Chunchos meet and occupy the Cerro de la Sal to take away this indispensable article of necessity, and the importance of occupying it may be well understood to give us the power of entering into friendly relations with them. Thus we shall meet with powerful help to crown the very important and grand work,—to reach the navigable rivers by means of a horse-road traversing rich and valuable valleys.

CAJAMARCA.

Cajamarca¹ is about seventy miles from Chachapoyas. Its present population is 8,000. It stands 9,400 feet above the level of the sea, and the temperature ranges from 40° to 72°. The province yields annually 7,000,000 pounds of wool, 160,000 head of sheep, 100,000 head of cattle, and 50,000 horses. The hot springs (Los banos del Inca) are renowned for baths, and pigs are scalded at 162°. The enormous riches of this region are matters of history. Cajamarca is famous for Pizarro's great battle with the Inca king, in the days of the conquest of Peru. It was then known for its famous

¹ See Mr. Jean Nötzli's Report, page 75.

mineral springs. We are told the weight of gold found at the baths and accounted for was 15,000 ounces, besides the gold goblets, seats covered with gold, and the presents of gold to Pizarro's brothers. It was at Cajamarca the Inca king collected gold and silver to pay his ransom. He engaged to fill with gold the apartment in which he was kept prisoner, which was twenty-two feet long, seventeen feet wide, and was to be filled as high as nine feet from the floor. He further agreed to fill an adjoining room of smaller dimensions twice full of silver. The total amount of gold collected at Cajamarca by the Inca king amounted in value of money at the present time to *three and a half million pounds sterling*. The quantity of silver is estimated at 51,610 marks (309,660 ounces). There being no iron at hand, nothing but gold and silver, Pizarro caused the horses of the whole troop to be shod with silver.

THE QUEBRADA OF TAMBOPATA IN THE PROVINCE OF
CARABAYA.

The illustrious English traveller, Mr. Clements R. Markham, undertook in the year 1858 a journey to the interior of Peru, when he visited the city of Cuzco, almost with the exclusive object of making ethnological studies on the remains of the ancient civilisation of the Incas. He likewise made an excursion to the great river Madre de Dios (Mother of God), which waters the fertile valleys of Paucartambo, with the object of knowing the famous Amarumayo, by whose waters the great expedition descended with the Inca Yupangui sent at the conquest of the Mojos. In the interesting work he published in London in 1856, he devoted a chapter to the Hydrographical Transandean Region of Peru, which in the country is known under the name of Montaña. In this work he gives an excellent historical and geographical *resumé* of the rivers Amazon, Huallaga, Ucayali, Madeira, and Purus. From a geographical point of view, the most important journey of Mr. Markham is that which he made in 1866 in the province of Carabaya, with the object of collecting seeds and plants of different

species of the cascarilla plant, in order to introduce its cultivation into India. He selected as a field for his work the Quebrada of Tambopata, which he traversed in different directions, carrying out his important mission with the greatest zeal and intelligence. This illustrious traveller published in London the account of his journey in Peru, containing interesting data respecting the province of Carabaya, and more particularly the Quebrada of Tambopata. To the intelligent work of Mr. Markham, England owes in a great measure the fortunate result attending the introduction and acclimatisation in India of the cascarilla plant.

VEGETABLE AND OTHER PRODUCTS OF THE SIERRA AND COAST.

Cotton.—Cotton of various qualities is raised in Peru. In the north of the Republic the country cotton, a biennial, is produced; towards the south, a cotton of a finer fibre is obtained; and lately the "Amazonian," which commands a high price in the market, has been introduced. A beautiful silk-like cotton is grown in the valley of Santa Ana. The indigenous cotton is readily bought up by manufacturers in England, the fibre being long and coarse; the finer qualities are also sought after to mix with wool. The cotton exported is grown on the confluence of rivers, and by irrigation on the west coast of the country. In the interior, wild cotton-trees are found 20 feet in height, the branches breaking down with their white load of the finest staple quality. In 1873, 81,441 bales were imported into England at Liverpool. The principal ports from which cotton is exported are, Pacasmayo, Payta, Eten, Chancay, and especially Pisco (grown in the rich valley of Ica). Flax is also found in Peru, but is valued by the Indians principally for its seeds, of which they make a kind of beer called chicha, while the stem, the most useful part of the plant, is left to perish.

Wine.—The richest wine-producing districts are in the provinces of Chicha, Ica, and Moquegua, the Bordeaux of Peru. The value of the vineyards in the province has been estimated at £3,000,000, and that of its annual pro-

duce in wine and aguardiente at £200,000. Next to Moquegua in the Department of Ica, which also produces wine on a large scale, a large amount of rum and wine is exported from Pisco. "Italia" is the name of the leading brandy. Oranges, lemons, melons, and olives are grown along the southern coast. The olives of Ilo and the raisins of Pica will compare with those of Seville and Malaga.

Wool.—After sugar, alpaca and vicuña wool is the principal export. The annual product is about 60,000 bales. It comes almost entirely from the Departments of Cuzco and Puno, the ports of shipment being Pisco, Islay, Mollendo, and Arica. But Arequipa is the great centre of the alpaca trade. Such is the reputation of the Arequipa brand that the wool is generally taken to that city to be re-assorted and re-packed. The alpaca sheep thrive best in the bleak, almost barren, boggy lands, from 13,000 to 14,000 feet above the sea. Shearing time begins about the middle of December, each sheep being sheared only once in two or three years. A fleece of three years is, of course, the largest, and commands the best price. It is now worth in Arequipa \$70 a quintal. Vicuña wool brings \$100 a quintal, but little is exported. About 4,000 goat-skins are exported annually from Payta to the United States, and a few chinchilla skins from Arica.

Silk.—Peru is admirably adapted for the cultivation of the mulberry and castor-oil plant, and the two species of silkworm which feed upon them. Three, four, and even five crops of eggs could be produced annually.

Many of the following particulars relative to the products and fruits of Peru have been translated, with corrections and additions, from the work of Dr. J. J. Von Tschudi :—

Cotton is cultivated only in a few plantations in the immediate vicinity of Lima, but it abounds more in the northern districts, particularly in the Department de la Libertad, the coast province of Piura, in Lambeyque, and in Truxillo. In the southern province, Ica, a considerable quantity is also reared for exportation. The brown cotton was chiefly cultivated in the time of the Incas. Most of the bodies found in the ancient graves on the coast are enveloped in this kind of cotton.

The *Sugar-cane* is cultivated with success in all plantations where there is sufficient moisture of soil ; and of all the agricultural products of this country it yields the greatest profit. The sugar estates lie on the sea coast, or along the banks of the rivers. The vertical limit of the sugar-cane growth is on the western declivity of the Cordilleras, about 4,500 feet above the level of the sea. The largest plantations, however, do not rise above 1,300 feet above the level of the sea, while those of the same extent on the eastern declivity are at the height of 6,000 feet. Within the last forty years the introduction of the Otaheitian cane has greatly improved the Peruvian plantations in quality, and has more especially increased the quantity of their produce ; for the Otaheitian canes are found to yield proportionately one-third more than the West Indian canes which were previously cultivated. The preparation of the sugar is, as yet, conducted in a very rude and laborious manner. In most of the plantations the cane is passed through wooden presses, with brass rollers. These machines are called *trapiches* or *ingenios*. They are kept in motion by oxen or mules. In some large estates water-power is employed, but in many districts the steam-engine has been put up, which does the work effectually and quickly. A part of the sugar-cane juice is used for making the liquor called *guarapo*, or distilled for making rum. The remainder is boiled down into a syrup, or further heated until it thickens into cakes, called *chancacas*, or brown sugar. After a careful purification it is made into white cakes, or prepared as white sugar. In fineness of grain and purity of colour, it may perhaps be inferior to Cuban sugar, but it certainly exceeds it in sweetness and flavour. The consumption of sugar in the country is great, and its export is considerable. A table showing the importations of Peruvian sugar to Great Britain, from the commencement of its export from Peru down to the present time, is annexed to this pamphlet.

Maize.—Of the different kinds of grain, maize is most generally and most successfully cultivated in Peru. It grows on the sandy shore, in the fertile mountain valley, and on the margin of the forest, where the warmth is great. There are several varieties of maize, which are distinguished from one

another by the size of the head, and by the shape and appearance of the grain. The most common kinds on the coast are—first, the *Maiz morocho*, which has small bright yellow or reddish-brown grains; second, the *Maiz amarillo*, of which the grain is large, heart-shaped, solid, and opaque; third, *Maiz amarillo de Chancay*, similar to the *Maiz amarillo*, but with a semi-transparent, square-shaped grain, and an elongated head. The morocho and amarillo maize are chiefly planted on the eastern declivity of the Andes. They run up stalks eight or nine feet high, and have enormously large heads. Maize forms the bread of the Indians of the mountains as well as of the coast. Like the potato of Europe, it is cooked in a variety of ways. Two of the most simple preparations of maize are those called *choclas* and *mote*. *Choclas* is the unripe maize-heads merely soaked in warm water; they form a very agreeable and wholesome article of food. *Mote* consists of ripe maize, first boiled, and then laid in hot ashes, after which the husks are easily stripped.

In the market in Lima, and in the large towns on the coast of Peru, there is an abundant supply of all kinds of vegetables, fruits, and flowers, all the year round.

Potatoes are planted on the coast, their quality being very good, but they are subjected to frosts, which frequently spoil them, and for this reason Peruvians depend principally on the crops of the hilly districts. On the higher ridges, which intersect the coast at short distances from the sea, the potato grows wild. I am inclined to believe that the root is indigenous in these parts, as well as in Chiloe and Chilé, and that the ancient Peruvians did not obtain this root from the south, but that they removed it from their own high lands, to cultivate it on more favourable soil. The best potatoes grow about twenty-two leagues from Lima, in Huamantanga, which is about 7,000 feet above the level of the sea, to the north-west of the Quebrada of Canta. This potato is small and round, with a thin white skin, and, when bisected, the colour is a clear bright yellow. It is called *Papa amarilla* (yellow potato), and there is a great demand for it in the market, where it fetches a good price. The other potatoes come chiefly from the Quebrada of Huarochirin, and they are very well flavoured.

The *Camotes* (*Convolvulus batatas*, L.), not improperly called sweet potatoes, grow to a considerable size. There are two kinds of camotes, the yellow and the violet; the latter are called *camotes moradas*. These two kinds are much liked for their excellent flavour. They cease to grow beyond the height of 3,500 feet above the level of the sea.

The *Aracacha* (*Conium moschatum*, H.B. Kth.) grows on the coast, but it is more abundant on the projecting ridges of the Cordilleras, and on the eastern declivity of the Andes. It is a very agreeable and nutritive kind of tuberous vegetable, in flavour not unlike celery. It is cooked by being either simply boiled in water, or made into a kind of soup. In many districts the aracacha yields two crops in the year.

The *Yucca* (*Jatropha manihot*), is one of the finest vegetables of Peru. The stalk of the plant is between five and six feet high, and about the thickness of a finger. The roots are from one to two feet long, somewhat of the turnip form. Internally, they are pure white; but the external stem is tough, somewhat elastic, and of a reddish-brown colour. The roots are the edible parts of the plant. They are very agreeable in taste and easy of digestion. When raw they are hard and tough, and their taste somewhat resembles chestnuts. When boiled in water the root separates into fibres, and is rather waxy, but when laid in hot ashes it becomes mealy. In some parts of Peru the Indians prepare a very fine flour from the yucca, and it is used for making fine kinds of bread, and especially a kind of biscuit called *biscochuelos*. The yucca roots are not good after they have been more than three days out of the earth, and even during that time they must be placed in water, otherwise green or black stripes appear on them, which in the cooking assume a pale red colour. Their taste is then disagreeable, and they quickly become rotten. To propagate the yucca, the stalk is cut, particularly under the thick part, into sprouting pieces, which are stuck obliquely into the earth. In five or six months the roots are fit for use, but they are usually allowed to remain some time longer in the earth. They then put forth new leaves and flowers, and after sixteen or eighteen months they become slightly woody. The Indians on the Montaña de Vitoc sent as a present to their officiating priest a yucca

which weighed thirty pounds, but yet was very tender. On the western declivity of the Cordillera, the boundary elevation for the growth of the yucca is about 3,000 feet above the level of the sea.

Pulse Crops.—Amongst the pulse there are different kinds of peas (*garbanzos*) on the coast; beans (*frijoles*), on the contrary, occupy the hilly grounds. All vegetables of the cabbage and salad kinds cultivated in Europe will grow in Peru. The climate, both of the coast and the hills, suits them perfectly. Numerous varieties of the genus *Cucurbita* are cultivated in the *chacras*, or Indian villages, on the coast. They are chiefly consumed by the coloured population. I did not find them very agreeable to the taste. They are all sweetish and fibrous.

Tomato, Aji, and Capsicum.—Among the edible plants which serve for seasoning or spicing, I must mention the love-apple (*Tomato*), which thrives well in all the warm districts of Peru; and the Spanish pepper (*Aji*), which is found only on the coast and in the wild woody regions. There are many species of the pepper (*Capsicum annum*, *baccatum*, *frutescens*, &c.), which are sometimes eaten green and sometimes dried and pounded. In Peru the consumption of aji is greater than that of salt; for with two-thirds of the dishes brought to table, more of the former than of the latter is used.

It is worthy of remark that salt diminishes in a very striking degree the pungency of the aji; and it is still more remarkable that the use of the latter, which in a manner may be called a superfluity, has no effect on the digestive organs. If two pods of aji, steeped in vinegar, are laid as a sinapism on the skin, in the space of a quarter of an hour the part becomes red, and the pain intolerable; within an hour the scarf-skin will be removed.

Lucerne (Medicago sativa) called by the natives alfalfa, is reared in great abundance throughout the whole of Peru as fodder for cattle. It does not bear great humidity, nor severe heat or cold; yet its elevation boundary is about 11,100 feet above the level of the sea. On the coast it flourishes very luxuriantly during the misty season, but during the months of February and March it is almost entirely dried up.

The *Maisillo* (*Paspalum purpureum*, R.) then supplies its place as fodder for cattle. In the mountainous districts it is also most abundant during the humid season ; but as soon as the frost sets in it decays, takes a rusty brown colour, and remains in a bad state until the beginning of the rainy season. On an average the alfalfa may be cut four times in the year, but in high-lying districts only three times ; and in humid soils on the coast, particularly in the neighbourhood of rivers, five times. Once in every four or five years the clover fields are broken up by the plough, and then sown with maize or barley. In the sixth year clover is again raised.

The *Olive-tree* is cultivated chiefly in the southern provinces of the coast. In flavour its fruit approximates to the Spanish olive. That the oil is not so fine is probably owing to the bad presses which are used, and the rude manner in which the operation is performed. The olives (*Aceitunas*) are preserved in a peculiar manner. They are allowed to ripen on the tree, when they are gathered, slightly pressed, dried, and put up in small earthen vessels. By this process they become shrivelled and quite black. When served up at table, pieces of tomato and aji are laid on them ; the latter is an excellent accompaniment to the oily fruit. Some preserve them in salt water, by which means they remain plump and green.

The *Castor-oil plant* (*Ricinus communis*) grows wild, but it is also cultivated in many plantations. The considerable quantity of oil which is pressed out of the seeds is used unpurified in Lima for the street lamps, and also in the sugar plantations for greasing the machines employed on the works.

The *Piñoncillo-tree* (*Castiglionea lobata*) is cultivated only about Surco, Huacho, and Lambayeque, in some of the Indian chacras ; but it grows wild in considerable abundance. Its bean-like fruit, when roasted, has an agreeable flavour. When eaten raw, the ethereal oil generated between the kernel and the epidermis is a strong aperient, and its effect can only be counteracted by drinking water. When an incision is made in the stem, a clear bright liquid flows out ; but after some time it becomes black and horny-like. It is a very powerful caustic, and retains its extraordinary property for years.

Vast quantities of *Apricots* (called *duraznos*) grow in the mountain valleys. Of fifteen kinds which came under my observation, those called *blanquillos* and *abridores* are distinguished for fine flavour.

Generally speaking, the interior of the country is well suited to all the fruits and grain of central Europe; and doubtless many of our forest trees would flourish on those Peruvian hills which now present no traces of vegetation. All the fruits of southern Europe thrive luxuriantly in the warm regions of Peru.

Oranges, Pomegranates, Lemons, Limes, &c., grow in incredible abundance. Though the trees bloom and bear fruit the whole year round, yet there are particular times in which their produce is in the greatest perfection and abundance. On the coast, for example, at the commencement of winter, and in the woody districts in the months of February and March, melons and sandias (*water melons*) are particularly fine.

The *Figs* are of two kinds; the one called *higos* and the other *brevas*. In the former, the pulp is red; in the latter, it is white. They are usually large, very soft, and may be ranked among the most delicious fruits of the country. Fig-trees grow frequently wild in the neighbourhood of the plantations and the chacras, and the traveller may pluck the fruit, and carry away a supply for his journey; for beyond a certain distance from Lima figs are not gathered, being a fruit not easy of transport in its fresh state, and when dried it is not liked. *Pomegranates* and *Quinces* seldom grow on the coast. They are chiefly brought to the Lima market from the neighbouring Quebradas. The *Mulberry-tree* flourishes luxuriantly, and without cultivation, but its fruit is not thought worth gathering, and it is left as food for the birds. In the southern province of Ica, the cultivation of the *Vine* has been attended by most successful results. In the neighbourhood of Lima grapes are seen only in a few huertas (orchards); but for size, sweetness, and aromatic flavour, there are no such grapes in any other part of the world.

The Chirimoya.—Of tropical fruits the number is not so great in Peru as in the more northerly district of Guayaquil, but there are some Peruvian fruits the delicious flavour of

which cannot be excelled. One of these is the chirimoya (*Anona tripetala*.) Hanke, in one of his letters, calls it "a master-work of nature." It would certainly be difficult to name any fruit possessing a more exquisite flavour. In Lima this delicious fruit is grown to the size of above two-thirds of a pine-apple. In Huanuco, its indigenous soil, it grows in the greatest perfection, and often attains the weight of sixteen pounds or upwards. The fruit is of roundish form, sometimes pyramidal or heart-shaped, the broad base uniting with the stem. Externally it is green, covered with small knobs and scales, and often has black markings, like net-work, spread over it. When the fruit is very ripe it has black spots. The skin is rather thick and tough. Internally the fruit is snow-white and juicy, and provided with a number of small seeds well-covered with a delicate substance. The chirimoyas of Huanuco are also distinguished from those of the coast by having only from four to six seeds, whereas on the coast they are found with from twenty-five to thirty. The question as to what the taste of this fruit may be compared with I can only answer by saying that it is incomparable. Both the fruit and flowers of the chirimoya emit a fine fragrance, which, when the tree is covered with blossom, is so strong as to be almost overpowering. The tree which bears this finest of all fruits is from fifteen to twenty feet high. It has a broad, flat top, and is of a pale green colour.

The *Palta* (*Persea gratissima*) is a fruit of the pear form, and dark brown in colour. The rind is tough and elastic, but not very thick. The edible substance, which is soft and green, encloses a kernel resembling a chestnut in form and colour. This fruit is very astringent and bitter, and on being cut a juice flows from it which is at first yellow, but soon turns black. The taste is peculiar, and at first not agreeable to a foreigner, but it is generally much liked when the palate becomes accustomed to it. The fruit of the palta dissolves, like butter, on the tongue, and hence it is called, in some of the French colonies, *Beurre végétale*. It is sometimes eaten without any accompaniment, and sometimes with a little salt, or with oil and vinegar. The kernels make a very good brandy. The palta-tree is slender and very high, with a small dome-like

top. On the eastern declivity of the Andes these trees can be seen more than sixty feet high.

Bananas (platanos) thrive well in parts where there is heat and humidity; there are many varieties. The platanos belong indisputably to the most useful class of fruit-trees, especially in regions where they can be cultivated extensively, for then they may very adequately supply the place of bread. In northern Peru and Guayaquil the platanos fruit is prepared for food in a variety of ways.

Pine-apples (ananas) are not much cultivated on the coast of Peru, but in the Amazon provinces and in the Montaña de Vitoc; but owing to the lengthy transport from the latter place, and the quicker communication by steam navigation along the coast, the Lima market is chiefly supplied from Ecuador.

The *Granadilla (Passiflora quadrangularis)* is about the size of an apple, but rather oblong. The skin is reddish-yellow, hard, and rather thick. The edible part is grey and gelatinous, and it contains numerous dark-coloured seeds. The fruit is very agreeable, and in taste resembles the gooseberry, and is very cooling. The granadilla is a shrub or bush, and it twines round the trunks of trees or climbs the walls of the ranchos. It is less abundant on the coast than in the adjacent valleys.

The *Tunas* are fruits of different species of cactus. The husk, which is covered with sharp prickles, is green, yellow, or red in colour, and is easily separated from the pulp of the fruit. When being plucked the tunas are rubbed with straw to remove the prickles, which, however, is not always completely accomplished. It is therefore necessary to be cautious in handling the husks, for the small prickles cause inflammation when they get into the fingers.

The *Pacay* is the fruit of a tree of rather large size (*Prosopis dulcis*), with a rather low and broad top. It consists of a pod from 20 to 24 inches long, enclosing black seeds, which are embedded in a white, soft, flaky substance. This flaky part is as white as snow, and is the only eatable part of the fruit. It tastes sweet, and, to my palate at least, it is very unpleasant; however, the Limeños on the coast and the monkeys in the woods are fond of pacay.

The *Lucuma* is produced along the whole coast of Peru. The fruit is round. The grey-brown husk encloses a fibrous, dry, yellow-coloured fruit, with its kernel. It is a very delicious fruit, and makes excellent ice-cream.

The *Guayava* (*Psidium pomiferum*) grows on a low shrub, chiefly in the valleys of the coast, and on the eastern declivity of the Andes. It is of the form and size of a small apple. The rind is bright yellow, and thin. The pulp is either white or red, and is full of little egg-shaped granulations. Its flavour is pleasant, but not remarkably fine. In Lima it is not a favourite, for numerous insects lay their eggs in it, and when the fruit is ripe larvæ are found in it.

The *Pepino* (a *Cucurbitacea*) is grown in great abundance in the fields. The plant is only a foot and a half high, and creeps on the ground. The fruit is from four to five inches long, cylindrical, and at both ends somewhat pointed. The husk is of a yellowish-green colour, with long rose-coloured stripes. The pulp or edible part is solid, juicy, and well-flavoured. The kernel lies in the middle, in a long-shaped furrow. By the natives the pepino is, not altogether unreasonably, believed to be injurious. They maintain that this fruit is too cold in the stomach, and that a glass of brandy is necessary to counteract its injurious properties. This much is certain, that the pepinos are very indigestible, and that eating them frequently, or at improper times, brings on fits of illness.

The *Mani*, or earth-almond (*Arachis hypogæa*), is produced in the northern provinces. The plant is from a foot and a half to two feet long, and very leafy. The kernels have a grey, shrivelled husk; they are white, and contain much oil. When roasted and crushed, they are eaten with sugar.

The *Capulies* (*Prunus capulin*) grow in the open fields. In the towns they are planted in gardens or in pots. The fruit is a little larger than a cherry. It is of a deep yellow colour, and has an acid taste. The capulies are not frequently eaten. On account of their very pleasant odour, they are used in making *pucheros de flores*, or, with other odoriferous flowers, they are besprinkled with *Agua rica*, and laid in drawers to perfume linen. The ladies of Lima

wear them in their bosoms. The same uses are made of the *Palillos* (*Campomanesia lineatifolia*, R.) which grow on trees from 20 to 30 feet high. The bright yellow fruit is as large as a moderately-sized apple. The palillo emits an exceedingly agreeable scent, and is one of the ingredients used in making the perfumed water called *mistura*. When rubbed between the fingers, the leaves smell like those of the myrtle; but they have an acid and astringent taste.

The *Quinua*-plant.—The quinua (*Chenopodium quinoa*) is grown extensively on the Sierra and the Puna, where it is found to be a nutritious, wholesome, and pleasant article of food. The leaves of this plant, before it attains full maturity, are eaten like spinach, but it is the seeds that are most generally used as food. They are prepared in a variety of ways, but most frequently boiled in milk or in broth, and sometimes cooked with cheese and Spanish pepper. The dried stems of the quinua are used as fuel. In Peru it is much liked, and is regarded in the light of a delicacy.¹

Four kinds of tuberous plants are successfully cultivated in the Sierra; viz., the potato, the olluco, the oca, and the mashua. Of potatoes there are several varieties, and all grown in perfection. The *Olluco* (*Tropæolum tuberosum*) is smaller than the potato, and greatly varies in shape, being either round, oblong, straight, or curved. The stem is thin, and of a reddish-yellow colour, and the inside is green. When simply boiled in water it is insipid, but it is very savoury when cooked as a *picante*.

The *Oca* (*Oxalis tuberosa*) is an oval-shaped root, the skin pallid, and the inside white. The *Mashua* is cultivated and cooked in the same manner as those already described. It is of a flat pyramidal shape, and the lower end terminates in a fibrous point. It is watery and insipid to the taste, but is nevertheless much eaten by the Serranos. The Indians use the mashua as a medicine; they consider it an efficacious remedy in cases of dropsy, indigestion, and dysentery.

¹ The writer has grown the *Quinua* plant to perfection in the neighbourhood of Southampton. It grows very rapidly in the open air, attaining the height of about three feet, and yields an abundance of seed which comes to early maturity. It will grow anywhere in England if required.

The *Coca-plant* (*Erythroxylon coca*) is cultivated between 5,000 and 6,000 feet above the sea, in the warm valleys of the eastern Andean slopes. It is a shrub like the tea-plant, growing about six feet in height, with bright green leaves and white blossoms, which turn into red berries. It is raised from seed in the beginning of January, in small plots of ground called *almazigos*. The following year they are removed to properly laid out coca fields and planted in rows, and crops can be gathered from them for forty years. When ripe the leaves are carefully gathered by women from off the trees, so as not to injure the twigs. The trees soon regain fresh foliage. The leaves are dried in the sun, and when perfectly dried are packed in bags. In Huanuco these bags weigh 75 to 80 lb., in Vitoc about 150 lb.

In the Montañas of Calca, Urubamba, and Paucartambo, the coca leaves are packed in baskets. Great care must be taken not to let the leaves get damp, otherwise they are spoiled. The Indian is never seen without his leathern pouch, called the *hualqui*, containing coca leaves, and he suspends his labour three or four times a day to masticate the coca, mixed with powdered lime, or the ashes of the quinoa plant, or the musa root. The flavour of the coca leaves is bitter, somewhat like green tea. The Indians undergo great amount of labour solely by the use of the coca. The fact that it is beneficial is evidenced by the longevity of the Indians accustomed to take it, who have reached the age of 130 years. The aperient qualities of the coca, no doubt, prevent diseases, and are most useful in counteracting the obstructions caused by farinaceous food. We will now pass on to cocaine, a product of the plant.

Cocaine.—The great benefit derived from the famed drug quinine, product of the Peruvian cinchona plant, and the amount of human suffering which has been relieved by means of its use throughout the world, are already well known. There is another drug which has lately been fortunately discovered by medical science, viz., cocaine, an alkaloid of the coca plant, mentioned above, to which we are indebted to Peru. It is only quite recently,—within the past three years,—that the valuable properties of this drug have been recognised by the medical profession in this country as a local anæsthetic. It is

especially invaluable for relieving pain during operations on the eye, as also for neuralgic pains on the face, &c. ; and for similar superficial operations this drug stands unrivalled. It entirely supersedes and dispenses with the use of chloroform and other drugs which were formerly used for such purposes, which are more or less of a dangerous nature. As a stimulant, the leaves of the coca plant are very remarkable, as it is well known to nourish and sustain the system for many days without any other food being taken. Cocaine is also made into a wine, and its valuable properties are daily becoming more generally recognised in this country.

THE PUNA.

The Puna is the name given to the high table-lands and cold bleak regions lying between the central and the coast range of the Cordillera. These lofty regions form the highest parts of the South American highlands, standing at an altitude of 15,000 feet above the sea. The Puna, although poor as regards vegetation, is richly and beautifully represented by the animal kingdom. It is the home of the llama, alpaca, huanuca, and the vicuña, so valuable for their wool, and the chinchilla, which resembles a rabbit, whose skin supplies the beautiful fur so much prized by the ladies of Europe. It lives on the steep rocky mountains, and feeds upon the alpine grasses. Deer inhabit the high forests. Large herds of cattle are reared on farms in sheltered valleys on the Puna. Owners of farms possess many thousand sheep, and from five to six hundred cows. They graze often at an altitude of 15,000 feet above the sea, sheep doing better in the dry season than cattle. The dry grass is burned every year, in order to improve the fodder. The cattle and sheep form the principal food of the mining districts. The beef is dried and called *charqui*, and the mutton *chalone*. Dogs are kept for hunting the vicuña and other animals.

Feathered game is very plentiful, and is represented by the huahua or species of goose, the black curassow, spoon-bills, cranes, snipes, &c., the yutu, a species of partridge, two species of ibis and plovers. The *lagunas*, or lakes, are



THE CHINCHILLA.

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inhabited by large numbers of water fowl, including the quiullus (white mews), the gigantic water hen, and many others. Birds of prey are represented by the immense condor and the huarahuan or the aloi, one of the grey falcon species.

As stated, the Puna is poor in vegetation. The expansive levels are for the most part covered with grasses of a yellowish brown tint, studded at intervals with queñoa trees (*Polylepis racemosa*), or by large patches of the katanhia shrub (*Strameria triandria*). The *Maca* is a tuberous root, and grows like the potatoes. The Indians boil it in milk, or roast it with maize, and in some districts it constitutes the principal food of the inhabitants. It thrives 12,000 to 13,000 feet above the sea. Barley is grown in the Puna at a height of 13,000 feet. It does not, however, attain maturity, but is cut green as fodder for horses.

ANIMALS OF THE PUNA.

The *Llama*.—The following is the description Dr. Tschudi gives of these valuable animals:—The llama measures from the sole of the hoof to the top of the head four feet six to four feet eight inches, and from the sole of the hoof to the shoulders from two feet eleven inches to three feet. The female is usually small, and weaker than the male, but her wool is finer and better. The colour of their wool varies greatly. It is generally brown, with shades of yellow or black, frequently speckled, but very rarely quite black or white. The speckled brown llama is in some districts called the moro-moro. The young llamas are left with the dam for about a year, after which time they are removed and placed with the flock. When about four years old the males and females are separated. The former are trained to carry burthens, and the latter are kept in the pastures of the level heights. Most of the flocks of llamas are reared in the southern Puna provinces, viz., Cuzco and Ayacucho, and from thence they are sent to the silver mines of North Peru. The burthen carried by the llama should not exceed 125 pounds, and the animal is seldom laden with more than a hundredweight. When the llama finds his burthen too heavy he lies down, and cannot be

made to rise until some portion of the weight is removed from its back. In the silver mines the llamas are of the utmost importance ; they are frequently employed to carry the metal from the mines in places where the declivities are so steep that neither horses nor mules can keep their footing. A flock of laden llamas journeying over the table-lands is a beautiful sight. They proceed at a slow and measured pace, gazing eagerly around on every side. When any strange object scares them, the flock separates and disperses in various directions, and the arrieros have no little difficulty in re-assembling them. The Indians are fond of these animals. They adorn them by tying bells round their necks ; and before loading they always fondle and caress them affectionately. If during a journey one of the llamas is fatigued and lies down, the arriero kneels beside the animal and addresses it with the most coaxing and endearing expressions. Notwithstanding all the care and attention bestowed on them, many llamas perish on every journey to the coast, as they are not able to bear the warm climate. The llama¹ finds sufficient sustenance in the moss and stunted herbage, principally the *ychu*, a species of grass that grows along the steeps of the Cordilleras. The structure of its stomach, like that of the camel, enables it to dispense with a supply of water for weeks together. Its spongy hoof, armed with two claws or pointed talons, enables it to take secure hold on the ice ; it never requires to be shod. The load laid upon the animal rests securely on its woolly back, without the aid of girth or saddle. The llamas move in herds of 500, or even 1,000, and thus, though each individual carries but little, the aggregate is considerable.

The Alpaca.—The alpaca, or paco, is smaller than the llama. It measures, from the bottom of the hoof to the top of the head, only 3 ft. 3 in., and to the shoulder 2½ ft. In shape it resembles the sheep, but it has a longer neck and a more elegant head. The fleece of this animal is beautifully soft and very long ; in some parts it is four or five inches in length. Its colour is usually either white or black, but in some few instances it is speckled. The Indians

¹ *Llama* also signifies flock



THE LLAMA.

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make blankets and pouches of the alpaca wool. The wool is largely exported to Europe, and in English markets it commands a good price. The alpacas are kept in large flocks, and throughout the whole of the year they graze on the level heights. At shearing-time only are they driven to the huts.

The Huanacu.—The largest animal of this family is the huanacu. It measures 5 ft. from the hoof to the top of the head, and 3 ft. 3 in. to the shoulders. On the neck, back, and thighs the huanacu is of a uniform reddish-brown colour. The under parts of the body, the middle of the breast, and the inner side of the limbs are of a dingy white. The face is dark grey, and the lips of a clear white. Of the huanacus there are not those varieties which are found among the llamas and the alpacas. The wool is shorter and coarser than that of the llama, and it is of nearly uniform length on all parts of the body. They live in small herds of five or seven.

*The Vicuña*¹.—The vicuña is a more beautiful animal than any of those just described. Its size is between that of the llama and the alpaca. It measures, from the sole of its foot to the top of its head, 4 ft. 1 in., and 2½ ft. to the shoulders. The neck is longer and more slender than in either of the other relative species, and from them the vicuña is also distinguished by the superior fineness of its short curly wool. During the rainy season the vicuña inhabits the ridges of the Cordillera, where some scanty vegetation is to be found. It never ventures up to the naked rocky summits, for its hoofs, being accustomed only to turfy ground, are soft and tender. It lives in herds consisting of from six to fifteen females and one male, who is the protector and leader of the herd. The Indians catch them by what is termed the *chacu*. They drive the vicuñas into circles formed by stakes and ropes, and then catch them by means of the bolas, a line with weights at each end, which they cast round the legs of the animals and impede their progress; this allows them to be taken alive.

¹ The present price of vicuña wool in the Liverpool market is 5/- per lb.

CHAPTER VIII.

The Gold and Silver Mines of Peru.

LIST OF THE MINING DISTRICTS.

NO country possesses such vast resources in metallic riches as Peru.¹ The mountainous districts from one extremity of the country to the other abound in all the precious minerals, such as gold, silver, platina, copper, iron, tin, lead, quicksilver, precious stones, salt, nitrate of soda, alum, coal, sulphur, saltpetre, petroleum, and other minerals.

The following mineral deposits deserving special mention on account of their richness were lately enumerated in a letter to the press by Admiral Aurelio Garcia y Garcia, Peruvian Minister to England:—"Beginning with the North, coal and petroleum are found on the seaboard comprised between Tumbes and Morrope, with shipping ports within a distance of a few yards; iron in the same department; sulphur and rock salt on the coast of Sechura, and near to the bay of that name; silver in Hualgayoc, Cajabamba, Celendin, and Chilete, which is partially connected by rail with the port of Pacasmayo; gold in Chachapoyas and Santo Tomas; silver in Pataz, Otuzco, and Huamachuco; and coal in Chala, which is also partially in railroad communication with the port of Salaverry; coal and silver in the pass of Huaylas, both considered as among the most valuable on account of their abundance and richness, their outlets being the ports of Chimbote, Samanco, Casma, and Huarney; silver in Cajatambo, and salt in Huacho, the port of same name being the outlet; silver in Yauli and the province of Huarachiri, along the line of the Oroya railway; silver in Morococha, Pucara, and in Tarma, the port of which

¹ Of its wealth and magnificence, the historian Frezier tells us:—"When the Viceroy, Marquis de la Palata, entered Lima, in 1682, the merchants showed their wealth by paving to the extent of 150 yards the entrance to the Royal square with ingots of silver, which were 12 to 15 inches long, 4 to 5 inches wide, and 2 to 3 inches thick, weighing on an average 200 marcs each, and amounting to £32,000,000 of our money."

is Callao ; also the renowned mines of Cerro de Pasco, which are rich beyond description ; quicksilver in Huancavelica, and silver in Castro-Vireyna and Lircay ; platinum and cobalt in La Mar and Canzullo ; copper in Ica, Lucanos, and Parinacocha, with outlet to the sea at Pisco and Chala, as also the gold mines of Aymaraes ; gold in Huayllura, Palmaderas, and Montes-Claros, the mines of which in their day yielded millions to the Crown of Spain, but work was stopped in consequence of the falling of the mine. This rich territory is of easy access through the port of Quilca, but the ports of Ocaña and Atico are within lesser distance and will be utilised when systematic work is undertaken. There are coal deposits in Sumbay and silver in Cailloma and Puno ; gold in Poto and Carabaya, connected with the coast by the railroad and port of Mollendo."

The mines of Huantajaya, near Arica, are particularly celebrated for the great masses of native silver which they contain in a decomposed *gangue*. In 1758 and 1789 two masses of native silver were found in two of its mines, one weighing 805 lb. and the other 200 lb.

From recent surveys of Señores Raimondi and Babinski, the gold mines known as the Palmaderas and Montes-Claros in the Union province are found to be amongst the richest ever discovered in Peru.

Rich gold mines have recently been discovered in Cerro Azul, a seaport south of Callao.

The silver vein at Carahuacra, in the Yauli district, is the fifth richest in the world ; it has been surveyed for a distance of three miles and has a thickness of 99 feet. (See description of this mine, page 133.)

WEALTH OF THE CERRO DE PASCO AND OTHER MINES.

Colonel Harris, speaking of the vast mineral resources of Peru, says :—"The records of Madrid show that Cerro de Pasco, Hualgayoc, and Huantajaya, three mining districts only, produced during the occupation of the Spaniards up to 1803, £169,889,100, as follows :—

Cerro de Pasco	£61,860,320
Hualgayoc	38,028,780
Huantajaya	70,000,000
	<hr/>
	£169,889,100

"The mind can scarcely comprehend the immense wealth produced from this country with the rudest appliances and unskilled labour."

Mining decadence has taken place yearly. Cerro de Pasco has lately only produced 200,000 marcs (100,000lb.), Hualgayoc is all but deserted, and Huantajaya the same.

In one mountain above Cerro Colorado there are over 400 veins, one of which is 100 yards wide and can be traced for leagues, and at the surface yields 14 marcs of silver to the cajon. This is one out of many hundred cerros which are completely ribbed with metal.¹

Copper ore can be raised in as great quantity as in Chili.

The Government of Peru, under its worthy president, General Caceres, in order to develop the resources of the country, and for the purpose of giving impulse to the mining industry, has resolved to open a mining exhibition in Lima, on the 28th July, 1888, at which will be exhibited a collection of the various minerals which the country produces, together with implements and machinery of the latest modern invention for mining purposes. English engineers are invited to send specimens of machinery to Peru for this exhibition.

COAL DISTRICTS.

There are many coal districts in Peru, several of them being of the best anthracite coal. Only a few of them are temporarily worked on a small scale. In 1877 the coal district of Otuzco, in Northern Peru, was explored by a Government Commission. They reported a very fine stratum at a short depth, ranging from 4 to 7 mètres thick, and expressed the belief that better strata may be found at greater depth. The different analyses yield an average of carbon of some 75 per cent. to 80 per cent., a splendid result.

The report says :—"As to the quantity of fuel, we dare say that it is immense, and that the district of Libertad is

¹ All the slopes and chains of the Andes are more or less crossed by rich silver veins, which in most cases are exposed to the eyes of the wanderer whenever he happens to take an unusual way through that labyrinth of mountains. The mining regulations of Peru being very liberal, any one may become the owner of the mine or mines he discovers for a very small fee of some 15 soles (60s.) paid half-yearly to the Treasury.—A. ESPINOSA.

able to supply the whole of South America during several centuries. Notwithstanding these mines are only some 40 miles from shore, and only 18 from a railway station, work is stopped at present, and will be until more hands and capitalists come to Peru."

The present average price of coal in Peru is \$22, or £3 per ton, and the average consumption 200,000 tons a year.

PETROLEUM WELLS.

Large petroleum wells exist all along the coast from Tumbes to Paita, but are only worked at Zorritos, some 10 miles south of Tumbes. Many thousands of gallons run into the sea, which in a more populated and enterprising country would be worked, and would form a considerable income to private persons and to the Government.

SALTPETRE.

Doctor Ignacio Abadie has reported the discovery of a rich deposit of saltpetre in the north of the Republic, extending for no less than sixty square miles. A commission of engineers are now surveying the district.

CERRO DE PASCO.

The following particulars as regards this celebrated argentiferous deposit have been translated from a pamphlet by M. du Chatenet on the present state of the mining industry of Cerro de Pasco, published in the "*Anales de Construcciones Civiles y de Minas del Perú*" (Lima, 1883):—"The name of Cerro de Pasco is justly known by the enormous quantity of silver which it has produced for the last two centuries. In spite of the immense mass of mineral which has been extracted, it still contains within its veins sufficient wealth to remunerate the work of many generations. Cerro de Pasco is situate between the latitude $10^{\circ} 55'$ and longitude $75^{\circ} 40'$ W. of Greenwich. Its height above the level of the sea, according to Paz Soldan and Babinski, at Chäupimarca is 4,327 mètres, or 14,198 ft. The town is situate at the north of a large plain formed between the principal chain of the Cordillera—which follows its ordinary direction of south-east to north-west—

and an immense circle which it appears to make towards the south-west. The population consists principally of Indians, of small stature, but broad-chested, stoutly formed, and much accustomed to hard work. It now contains 8,000 to 9,000 inhabitants. The climate is healthy, although it is subject at certain seasons to heavy storms of rain and snow."

GEOLOGY OF CERRO DE PASCO.

Notwithstanding the difference in their nature and composition, the ores of Cerro de Pasco are all valuable for their metallurgy of silver. We will use the same classification as the miners of the district, who distinguish, amongst themselves, the *pacos* or *cascajos*, the pyrites, the *pavonados*, the ores containing lead, copper, and silver. All are argenteriferous, and contain a variable quantity of silver, from traces hardly visible in certain *pacos* or pyrites, to a fair proportion in some *pavonados* (grey copper ores). Of these different ores, at the present time there is only one class which is the object of active work—the *pacos*. Only a few cajons, of the other ores are occasionally worked.

The ores generally known in Peru, under the name of *pacos*, are the same as those called *colorados* in Mexico, and the two words, which are the same in Spanish and in Quechua, arise from the red colour, more or less bright, in which these ores always appear. This class of ore appears peculiar to America. Its exterior characteristics do not denote the presence of silver to a mineralogist who is not familiar with them. They are more like an iron ore of medium ley than a silver ore. All have an appearance more or less stony and earthy; they scarcely ever show any trace of crystallisation, and are coloured more or less strongly by oxide of iron, which forms an important part, and at times almost the whole, of the ore. Respecting their chemical composition, these *pacos* present the peculiarity of having only oxidised matter, and even these are found under the state of higher oxidation.

These are the general and common characteristics of all

¹ The cajon of Peru is equal to three tons.

the *pacos* or *cascajos*, but their chemical composition varies according to the positions in which they are found. In almost all oxide of iron forms a principal part; others have, besides, lead or copper—the lead in the state of carbonate, the copper in the state of oxide or carbonate. Ferruginous ores are chiefly found in the *tajo* of Santa Rosa and its vicinity; copper ores are found in the district of Yanacancha, and generally under the buildings of the city; lead ores in the upper part of the Pariajirca district, at a short distance from the limestone rocks which divide the ore regions from the eastern side. Not only do the *pacos* differ in composition, but also in structure; they are presented under various conditions—some of a variable colour, from clear yellow to dark red; they appear to have a homogeneous structure, and are principally formed of oxide of iron more or less compact, being a combination of various oxides. They are found either stony or earthy, and are extracted either by powder or dynamite, or simply by the pickaxe. They are either as solid as rock or as friable as earth, the appearance of which they have. In the first case they are called *cascajos*, and in the second *llampos*. Others, on the contrary, are principally composed of siliceous sandstone, with a little earthy matter which appears to be impregnated with oxide of iron—as in many mines of the *tajo* of Santa Rosa. This argentiferous sandstone is designated under the name of *pedernal*. The *pedernos* are a variety of *cascajos*, harder than other kinds, and are worked by means of powder. Sometimes the *cascajos* present the appearance of scoria, having a half-melted half concretionary appearance, and showing innumerable cavities or pores. This variety is interesting as showing the mode of formation of these minerals, and is called *chicharrones* by the miners.

In the lower part of the earth, which shows the phenomenon of oxidation, there is found at times, on the upper side of the vein, like a covering, earthy ores called *caprichos*, which are worked in some mines. In the same situation, these ores, when they are more yellow and charged with iron, take the name of *pastelillos*. The *cascajos* are nothing more than a hard or decomposed sandstone impregnated with iron and silver. It is almost im

possible to say to which formation this sandstone belongs. The Cerro does not contain fossils of any kind, and the study of the stratified formations affords no results, on account of the *capas* (stockwerk¹), which do not show any kind of stratification. There is no other means of deciding this question except the very uncertain method of examining the structure and character of the rock. This leads to the conclusion that the Cerro is of Jurassic formation.

Whatever may be their composition or nature, these *pacos* of the Cerro do not contain a high percentage of silver; in many cases there sometimes exist traces of that metal, considered profitably workable when they contain at the least four marcs (32 ounces) to the cajon. It would be difficult to say up to what percentage the richest ores might yield; some of the mines are known to produce rich-yielding ores of twelve to fifteen marcs (96 to 120 ounces), but they are very scarce. It may be said that the greater part of the mines actually worked furnish very poor ores of from four to six marcs the ley. These ores, now being worked by the miners, form the backbone of the district. It is evident that the profitable ores are by no means as rich as many imagine, but, in spite of the great diminution of production in the Cerro, the mines continue to yield annually considerable quantities of silver. The reason is, the inexhaustible abundance in which the ores are found, and the facility with which they can be worked.

Cerro de Pasco is, owing to the enormous quantity of argentiferous minerals it contains, certainly one of the most important deposits of silver in the world. Its mode of occurrence is likewise very interesting from a geological point of view, and scientists differ considerably as to its origin. The mineral matter which generally yields the useful metals shows itself in three different modes of occurrence,—small fissures or veins, as *capas* or stockwerk,

¹ Stockwerk is the name given to the appearance of veins which, by successive nearly parallel fissures, are filled with mineral matter; a vein becomes of very great and almost indefinite width, making it difficult to follow. Veins of this description are worked in successive floors or storeys.

and in groups or distinct layers, the geological formation being either of igneous or sedimentary origin. The examination of the boundary between the argentiferous and sterile rocks can hardly serve to determine this question, since in the Cerro the boundary is very indefinitely defined. When we take into account the extent of the deposit, this fact is not surprising, if an igneous origin be attributed to this formation; the contact of the erupted materials with the walls of the fissure which has been filled with mineral matter would have produced a powerful metamorphism in the sedimentary strata; as in limestones, the argentiferous material would have been able, under the influence of pressure and heat, to impregnate them a little, therefore it can be easily understood how it happens that in certain parts silver ores are found in the limestone of the Cerro. If, on the contrary, we consider the formation to be of sedimentary origin, it can be explained on the hypothesis that during the eruption of the neighbouring rocks, and of the metamorphism which they have caused, small portions of the pre-existing materials have been drawn along, or separated from, the principal mass, and transported to a certain distance.

In the Cerro the miners often speak of veins, but I believe their idea of that word does not convey the same signification as that of its literal sense, and that they only designate as veins the richest parts of the ores, which yield enough metal capable of being refined with profit. Without expressing any opinion as to the mode of formation, I did not find any deposit deserving the name of vein or fissure in the generally accepted sense of the words. May not the metal-bearing formation of the Cerro be a single vein of variable richness and of considerable width? Serious objections could be raised to this theory. Whatever may have been the mode of formation of a vein, the nature of its constituents always shows certain special characters. Three different ingredients are observed in its composition—the *relleno*,¹ the *gangue*,² and the useful

¹ The *relleno* is the principal mass of rock which surrounds the vein of workable ore.

² The *gangue* is the matrix or portion of a rock in which an ore is deposited.

ore. The gangue mass contains different materials, but most of them are sterile; for example, pyrites, spathic iron, the different oxides of iron, zinc blende, quartz, felspars, arragonite, carbonate or sulphate of lime, fluor-spar, sulphate or carbonate of baryta, &c. Of the metals which generally constitute the gangue mass, we meet with pyrites and oxide of iron at different altitudes. Here these materials are not really the gangue, but the useful substance; and they are very far from constituting the whole of the mass, since the *cascajo* and pyrites have sandstone as the principal component part, as is observed in the pedernal of Santa Rosa. The structure of these materials does not resemble an igneous origin; they have scarcely any crystals, and are hardly ever found crystallised with carbonate of lead. The general mass of the metal does not present a crystalline structure whatever, as happens in veins, where the small cavities are decked with crystals.

The Cerro can be easily considered as forming a strata, or rather a series, of stockwerk. However, it is not easy to recognise the stratification; in some parts there can be seen some traces of formation of *pacos*; generally nothing can be absolutely distinguished, as the rocks are of a homogeneous structure, and their different aspects or nature follow no visible rule. However, it is without doubt, all the materials which compose the deposit exist in the state of stockwerk; many other deposits are found where there is no doubt that the formation is of sedimentary origin.

If we consider the Cerro as one immense aggregation of metals, which may be either one vein or one stockwerk, it appears to me most natural, for the reasons already given, to take it for sedimentary formation. Up to the present time there have been no researches sufficiently deep to decide the question as to which formation it belongs.

In the neighbourhood of Cerro de Pasco there are being worked at present thirty mines, of which Colquijorca and Vinchos are the oldest. They are working in the Candalaria mine a magnificent vein of argentiferous ore. In working the mines it is customary, on arriving at a depth

when they meet with water, to abandon them without any effort, in most cases, being made to drain them, and a new mine is commenced.

In Cayac	there are 33 mines working, and 76 abandoned.			
„ Pariajirca	„	2	„	46 „
„ Mataderia	„	1	„	9 „
„ Chaupimarca	„	...	...	32 „
„ Yauricocha	„	2	„	68 „
„ Paccha	„	1	„	54 „
„ Patarcocha	„	...	...	26 „
„ Santa Rosa	„	62	„	53 „
„ Ayapoto	„	9	„	4 „
„ Huancapucro	„	3	„	4 „
„ Arenillapata	„	12	„	16 „
„ Valeria	„	7	„	„
„ Santa Catalina	„	11	„	11 „
„ Uliachin	„	3	„	15 „
„ Portachuelo	„	3	„	23 „
„ Tingo	„	4	„	2 „
„ Pampas de San Andres	„	5	„	27 „
„ San Juan	„	1	„	7 „
„ Rumillana	„	...	„	4 „
f „ Mata-gente	„	2	„	4 „

From the Mata-gente mine,¹ according to report, the richest mineral was extracted, but the working has been almost suspended owing to a general falling in of the mine, which buried 300 workmen. For some time past the miners of the Cerro have been actively engaged with the question of the water in the mines, which is of vital importance for the prosperity of the district. The department of Public Works is now constructing a tunnel to drain the mines. It is to be cut from Mesapata as far as the valley of Rumillana, where it will empty itself.

Comparing the return of silver bars cast at the foundry in late years to those formerly cast there, it is seen that the production has decreased considerably ; formerly the quantity exceeded 300,000 marcs, but lately it has decreased to 159,000 marcs.

¹ "Mata-gente" means "kill-people," and is the name by which this mine has been known since the accident.

ITS COAL DEPOSITS.

The combustible mineral deposit of Cerro de Pasco may be considered as one of the richest of the Republic, but as the use of coal has not been extensively introduced in the refining of the ores, this wealth is almost useless, and its working almost nil. Of these combustibles the most important is coal, which exists in very many parts of the province. The beds are generally much charged with volatile materials, mostly pyritous, and have a large proportion of ash; very bituminous specimens are met with, which can be advantageously used in the manufacture of gas.

There are altogether sixty-four coal mines, of which twenty-eight are being worked, and thirty-six are abandoned. The coal, which is consumed for domestic purposes and smith's work, is worked principally in the districts of Chacayan, Pária, Jusi, and Huallay, and that obtained from Raneas is used in the smelting foundries and for distilling the amalgam. The only cause which exists for such a small consumption is the difficulty of transport. The mines are situated several leagues from the towns, and the coal cannot be brought there except on the backs of animals, on which account the working of this combustible is exceedingly inactive, and at the present time there is not a single mine which merits the name of such by the quantity of material taken out. The coal industry, now of so little importance in the Cerro, is capable of being very rapidly developed as soon as the railroad is constructed, which will place this deposit in communication with the coast. Being then sure of finding a demand for their products, the proprietors of the mines would establish roads to the railway, and increase very considerably their workings; there will then be an abundance of coal brought to the Cerro at a low price, which will bring about a radical change in the methods now employed, by the adoption of a more perfect system of smelting, by which means they will be able to work at a greater profit all the varieties of ore which exist in that deposit.

Coal is not the only fuel which nature has provided in this deposit; in the quebradas or pampas which are near

the Cerro there is found a large quantity of peat, which the Indians call *champa*. This peat, dried during the summer, serves very usefully for domestic purposes, and although it constitutes a fuel of inferior quality, it would probably be profitable in the operations of a local industry.

The animals provide by their excrements another class of fuel, which is known as *táquia*; this they collect from sheep and llamas. Owing to its abundance and cheapness (one ton of *táquia* only costs at the most ten soles), it is used by the Indians in foundries for refining galena.

MAGISTRAL.

The galena ores are smelted by means of furnaces. Another industry assisting in the refining of the pacos in the Cerro, is the making of magistral.

The useful properties of magistral arise from the sulphates of copper and iron which it contains, and its separation is effected by the heating of iron and copper ores; these metals are a mixture of iron and copper pyrites with other copper ores, which gives the material a black colour. As the magistral owes its active qualities to the proportion of copper which enters into its composition, the ores which contain the most copper are those most valued for this purpose; these ores are taken from some mines in the district of Zancanacha.

The operation of manufacture is carried out by means of a reverberating furnace of very simple construction, *táquia* being used as fuel. The furnace is charged through an aperture in the upper part of the arch. An oven-full, consisting of 120 arrobas of crushed ore, is introduced; the fire is kept at a temperature of a deep red heat, so as not to melt the material. Air enters freely by the door of the furnace, to facilitate the formation of sulphates. When the fumes of the gases diminish, twelve arrobas of ground salt are added, which is mixed with the other materials. The operation is completed when the fumes of sulphuric acid cease, and the furnace is then discharged for another supply. Salt is mixed with the other materials for the purpose of converting the copper to a soluble state, by the chloridisation of the oxide of copper which

had not become sulphuretted, or that proceeding from a decomposition of sulphate already formed. A sample of magistral in most use in the Cerros gave the following results :—

Part soluble in water	Sulphate of copper	9'75	} 18'85 %
	Sulphate of iron	1'14	
	Chloride of sodium	3'36	
	Sulphuric acid in excess	4'60	
Part in- soluble	Oxide of copper	1'50	} 81'15 %
	Peroxide of iron	44'92	
	Oxide of lead	3'78	
	Sulphuric acid combined with lead and iron.....	2'80	
	Silica and other materials	28'15	
		<hr/> 100'00	

This result is very interesting, as it plainly shows the fact already known by all the miners, that the power of magistral depends principally upon its proportion of copper, whilst the iron possesses scarcely any importance.

THE SALT MINES.

The mines which supply the salt employed in refining the ores are situated at San Blas, twelve miles from the Cerro, and belong to Señor Agustin Tello. As there are several salt springs in various parts, no doubt other mines will be discovered.

WANT OF DRAINAGE TO THE MINES.

The silver mines, with some exceptions, are not in the hands of rich persons, but in the hands of those who are obliged to borrow at the banks at various rates of interest. There is no spirit of association ; each one separates himself from the others, and they have introduced no improvements since the time of their forefathers. In order, therefore, to re-establish its former importance, it is necessary to give fresh impulse to the execution of the works for draining the water from the mines, and the miners and proprietors of the Cerro ought to make every effort to perfect or change the primitive methods which they are at present using. Thus the

prosperity of the Cerro can be revived, and this celebrated region will continue to merit in the future, as in the past, its renowned fame for proverbial wealth

PROFESSOR ORTON ON THE CERRO DE PASCO.

The most famous silver mines in South America, after those of Potosi, are the mines of Cerro de Pasco, sixty leagues N.E. of Lima. They are situated on the Atlantic slope of the Andes, over 13,000 feet above the sea, where the prevailing rock is conglomerate. The silver, discovered by an Indian in 1630, occurs in the native state, also as sulphide mixed with pyrites, cobrizo (a carbonate of lead and copper, with sulphide of copper), and with oxides, forming what are known in Peru and Mexico as pacos and colorados. The ore is treated with salt and mercury, but so rudely that generally one pound of mercury is lost to every half a pound of silver extracted. Fortunately Cerro de Pasco is only 200 miles from the celebrated quicksilver mines of Huancavelica. According to Herndon, the ore yields only six marks to the cajon. (A mark is eight ounces, and a cajon three tons.) A representative specimen in my possession contains 0.004 of silver. During the last two centuries and a half, the mines have produced about \$500,000,000. The annual amount of ore mined, at present, does not exceed 110,000 tons, each cajon yielding on an average $4\frac{1}{2}$ marks (36 ounces), the amalgam containing 22 per cent. of silver. Just now work has nearly ceased, owing to the inadequate means of drainage. But at Cerro de Pasco, as at other places, it has been found profitable to re-work by the improved modern methods the tailings left by the old Spanish miners. The contemplated connexion of the Oroya Railroad with a line from Pasco will give new impetus to the mining interest.

Hualgayoc, fourteen leagues north of Cajamarca, has long been celebrated for its rich mines, but it is also afflicted with a plethora of water. The Cerro, unlike most silver mountains, presents rugged, tower-like points, and is perforated on every side up to its very summit. The rock is siliceous. There are many good mines in the vicinity of Lampa and Puno, on the borders of Lake Titicaca; those of Manto, Salcedo, Chupica, and Cancharani were

famous in Spanish history. In the seventeenth century the mines of Puno were inferior only to those of Potosi. The richest ores are called brosa, rosicler, and pavonado. The first yields forty marcs to every fifty quintals of ore. The ores of Huantajaya, Carmen, and Santa Rosa, near Iquique, yield from 2,000 to 5,000 marcs to the cajon. Without question they are amongst the purest in the world. Masses of pure silver have been found on the surface of the plain, one weighing 800 lb. Rich deposits occur also in the province of Cailloma, north of Arequipa, and at Yauli, San Mateo, and other localities near the Oroya Railroad. Extensive veins have been recently discovered at Chilete, the terminus of the Pacasmayo Railroad, the ore assaying from \$60 to \$200 a ton. A Bostonian has a large interest in this mine. Silver associated with gold and copper is found in the Cerro Potoche, near Huancavelica. The mines of Hualanga, near Tarma, have yielded 3,000 marcs in a year.

THE SILVER MINES OF YAULI.

Extracted by permission from "Apuntes sobre el Distrito Mineral de Yauli,"¹ by LEONARDO PFLUCKER Y RICO. Lima, 1883.

Leaving Lima by the Oroya Railroad, in nine hours one arrives at the end, which is at present the small town of Chicla, situated in the narrow and deep ravine of the Rimac, at 126 kilomètres (seventy-eight miles) from Lima, and 3,725 mètres (12,162 feet) above the level of the sea. From thence it is a short day's journey to the town of Yauli, passing by the mining haciendas of Pomacancha and Bellavista, the villages of Acchahuaro and Casapalca, and the quebrada of Piedra Parada, which contains rich veins of silver, copper, and lead. Passing the mining establishments of "El Carmen" and "La Americana," and gaining the summit of the Cordillera at the narrow pass of Paracte or Piedra Parada, at an altitude of 4,900 mètres (16,076 feet) above the sea, from thence descending by the valley of

¹"Anales de Construcciones Civiles y de Minas del Perú," published by the School of Mines, Lima, 1883.



MINING HACIENDA OF POMACANCHI,

Face page 130.

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Viscas, we arrive at Yauli, the total distance from Chicla being thirty-one kilomètres (nineteen miles.)

The town of Yauli is situated in a quebrada or valley, watered by an affluent of the Mantaro. There is nothing particularly deserving notice. The houses are built of adobe bricks, with roofs of straw or corrugated iron. There is a good school for boys and girls; the inhabitants number 600, and the district of which Yauli is the capital contains 5,326 inhabitants. But the town owes its importance to being the centre of an exceedingly rich mining district. It lies on the high road from Lima to Tarma and Jauja, or rather to the Junin Department, the trade of which to the coast is very considerable.

The province of Tarma, comprised between 11° and $11^{\circ} 40'$ south latitude, extends from west to east from the summit of the Cordillera mountains to the river Ene (formed by the Apurimac and Mantaro), which separates it on the east from the department of Cuzco in the virgin region of the Montaña. It is one of the four provinces which comprise the department of Junin. Between the two crests of the Cordillera mountains, which are distant from twenty to sixty kilomètres apart, there extends (from N.N.W. to S.S.E.) an elevated table-land at an altitude of 4,400 mètres, but so intersected by wide valleys and deep ravines, that it loses, in fact, the character of such, being traversed by ridges of greater or less extent, which enclose within them numerous valleys and narrow passages, generally traversed by rapid streams, all of which form the special characteristics of the table-land, or Sierra, the part of the province which is most populated, and which has the most productive and abundant resources.

From north-west to south-east the table-land is traversed by the Mantaro or Oroya, which is the most important river. This river has cut a deep channel, into which flow all the rivers and streams which fall from the two lower flanks of the Cordilleras. The river Chanchamayo, with its affluents, form an exception, which, taking its source in the table-land south-west of Tarma, passes to the north-east, crossing the Oriental Cordillera through a deep and narrow quebrada, and flows into the Perené.

The ridges and smooth declines of the table-land, although in some parts arid, are usually found covered with an abundant natural pasturage, which serves to rear a large number of animals, such as sheep, vicuñas, and llamas. There are places where the pasture grows over one mètre (3½ feet) in height, and some farms maintain 30,000 head of sheep. On account of the climate being cold, this elevated region, called "puna," is but scantily populated. Apart from some houses in which the resident managers of estancias or proprietors of sheep reside, there are only to be met with here and there shepherds' huts, which are a considerable distance apart. No rain falls here, only snow and hail.

The villages and houses are built in sheltered valleys. Barley, potatoes, wheat, maize, and other fruits are cultivated, according as the country descends to the valleys of the Mantaro and Chanchamayo. The upland rivers, being only small, can be easily forded in the dry season, and even in the wet season it is not difficult to cross them.

The geological structure of the Yauli district shows numerous eruptions in the immediate neighbourhood of the Cordilleras, but towards the centre of the table-land the disposition of the strata is more regular, and in some places it is horizontal. In the Oroya valley the strata are found in a vertical position. A great number of fossils are found in the calcareous deposits, and at Chaplanca, 4,467 mètres (14,655 feet) above the sea, there is an immense quantity of ammonites, several of which measure 36 centimètres (14 inches) in diameter, and many other fossils.

Mineral Springs.—There are warm mineral springs near Chaplanca and Yauli; the temperature of the former is 54° Centigrade. The water, when taken, is somewhat laxative, and as a bath it has been employed with excellent results in curing skin and other diseases. According to the analysis of Señor Raimondi it contains sulphates, chlorides, and carbonates of sodium, calcium, magnesia, lithia, and iron, the salts of sodium chiefly predominating. In this respect, as also for its high temperature and in its deposits of *Toba*, it resembles the celebrated mineral waters of Carlsbad, in Bohemia.

Metalliferous Veins. The principal Cordillera offers an extraordinary abundance of metalliferous veins in the whole of its extent, and they appear to be intimately united to those of the eruptive rocks. In the centre of the table-land, where the strata are but little dislocated, veins are rare and of little value.

The Mines.—The miners now limit themselves to working the veins of silver and a few of the deposits of coal in the district. The veins of silver, including under that denomination *argentiferous* galena, predominate over all others, together with important veins of copper and antimony and a small amount of cinnabar.

Andaichagua, a village situated to the east of Yauli, is the region of native silver *par excellence*. The principal mine, Machoruca or San José, is not worked. Its ores are composed of lead (*ronco*), native silver, zinc blende, and quartz. There are many other mines of less importance.

Carahuacra, situate to the south of Yauli, is the most renowned and productive vein in the district. It has been surveyed and found to extend for a distance of 5 kilomètres (3 miles), and its thickness in places to be 30 mètres (99 feet). These enormous dimensions rival the largest silver veins known, such as the Comstock in Nevada, which is 7 kilomètres ($4\frac{1}{4}$ miles) long and in parts 60 mètres thick; the Veta Madre of Guanajuato, 14 kilomètres ($8\frac{1}{2}$ miles) long and 10 to 66 mètres thick; the great vein of Zacatecas, of little less length than the former, and 10 to 22 mètres (33 to 72 feet) thick; and the great vein of galena in Clansthal, in Prussia, 8 kilomètres long (5 miles) and from 6 to 130 feet thick. The Carahuacra vein is superior to these in the richness of its ores. Its course is north-west to south-east, in which direction there is seen rising above the surface a gangue quartz of dark grey colour, interrupted by an accumulation of large boulders of dark grey colour lying in the direction of the gangue. It is composed of quartz, of grey or black colour, in which the ores are scattered in small irregular veins or nests, which makes the working somewhat difficult. There are ores of silver—native silver, ruby silver, rich *pavonado* (argentiferous grey copper ore), with much zinc blende, pyrites, and a little galena; the

zinc blende is of different colours, yellow, chestnut, and black. The northern part is the better known, and up to the present time has almost exclusively produced the metal. Here also are the Carmen (San Antonio de Callapa), San Francisco, San Marcos, and San José (Ventanilla) mines, which occupy, according to the *Padron de Minas*,¹ an extent of 1,600 yards (1,337 mètres).

The *San Francisco Mine* had been, without doubt, much worked during the colonial period, as is shown by the extent and depth of its works. In the San Francisco mine the predominating ore is ruby silver with zinc blende; in the San Marco, a mine likewise much worked, although not so much as the former, it is the *pavonado fino* (argentiferous grey copper ore), under which name they denote the grey copper ore of high ley of silver, which is generally 8 to 10 per cent.² The other mines are abandoned.

Pomatarea, to the south-west of Yauli, is a valley enclosed on the north by snow-carpeted hills, on both sides of which there are argentiferous veins.

Galera.—In the quebrada of this name, situated on the north-west of Yauli, there are various mines, now abandoned; one owned, the San José, but not worked.

Paracte.—This cerro, situated near the Piedra Parada Pass, contains several mines, amongst them two are owned, the Carmen and the San Francisco (Saco Huarmi). Both have produced in former times good ores, those of the San Francisco mine yielding *pavonado fino* (argentiferous grey copper ore) with quartz. But to the west, on the western slope of the Cordillera, are the Bella Union and Araucana mines, in the Cerro Chuquichuecho; the San Antonio, in Colquiputo; the Elena, in the Cerro Cuarenta Varas; and the Señor de los Milagros, in Antapuerro. The ores from these mines are exported to Europe. In the Bella Union they are composed of argentiferous grey copper ore, zinc blende, and pyrites in quartz. In the Cerro Pucaurco, near the Pass of Antarangra, the Volcan mine is worked in a vein half a metre thick, extending north-east and south-east. Its ores,—*pavonado*

¹ The *Padron de Minas* is the official Register of Mines, published half-yearly.

² This is an extraordinary rich ore.

fino, rosicler (ruby silver), galena, zinc blende, and pyrites in quartz (white and red),—are exported to Germany; the ley of the silver 0·5 to 0·6 per cent., of gold 0·4. It is still worked.

Anticona.—To the east of Antarangra. In this ravine they work at the north of it, at the foot of the Nevado Yanasinga, the Libertad mine; towards the west, the San José mine, which is owned. To the south-east of this point, and of the Cerro Pucauro, is the place called Tarantan; here the Esmeralda mine is situated.

Alapampa.—On the descent of the mountain, extending to the north of the lake Huacracocha, there are various mines; the most important is Yanamina. There are also owned in this cerro the San Joaquin (or Aguilar) and San Pedro Alcántara mines.

Nuevo Potosi.—This cerro, which rises 379 mètres above the immediate hacienda of Morococha, extends from south-east to north-west. The stratified ground contains numerous argentiferous veins, which run perpendicular to the *eje*¹ of the cerro, and some parallel to it, the principal from the west.

Santa Barbara and *Santa Rita*.—The latter is a vertical vein of one mètre thick, running north-north-east; it is at present being worked.

San Antonio.—A mine much worked during the last thirty years, and which has at times employed 250 men. The ore is very rich (100 marcs of silver per cajon, or 0·8 per cent.²). The ores are refined in Tuctu by amalgamation.

Elvira.—A mine still being worked.

Purísima.—A vein half a mètre to one mètre thick, not worked.

San Pablo.—The nearest to the eruptive rocks; not worked.

Victoria.—A wide vein, half a mètre to three mètres thick, not worked.

¹ *Eje*, direction of the length of the cerro or hill.

² The Peruvian cajon consists of 3 tons, each 2,000 Spanish pounds. The Spanish pound contains 2 marcs of 8 ozs. each; the value in the decimal measure being 460 grains. A marc is, therefore, one 12,000th of the cajon.

Yacumina.—In this district, situated to the south of Morococha, two mines are worked.

Buenaventura.—The vein is vertical, one mètre thick.

The Cerro Santa Clara, between Morococha and Yauli, contains argentiferous veins; in it are situated the mines registered in the Padron, Octavio Rubi.

Toldojirca.—To the south of the lake of Huacracocha there is a cerro in which are situated the Pucalabor, Libertadora, San Antonio, and San José mines; and in close proximity on the west the mine of Sacramento Pucalabor, which has a vein one mètre thick, but is not worked. San José, a vein one mètre thick; its ores are refined at Tuctu; its ley of silver is generally 0·2 per cent., rising above that when they contain pavonado. San Antonio and Libertadora, situated in the centre of the cerro, are two mines in the renowned manto¹ of Toldojirca, which consists of a (faja) of ore (galena, with lead ronco) from half a mètre to one mètre thick. The argentiferous manto having yielded ores of 60 to 100 marcs (0·5 — 0·8 per cent. of silver), and in time of *boya*² from 400 to 800 marcs per cajon (3·3 — 6·7 per cent.). Accompanying the galena is cerusite, anglesite, azurite, and malachite; sulphite of silver has been found in small nests, disseminated in the form of small powder.

Alpamina.—To the east of the former is another cerro which was noted for the quantity of rich metal which it produced in former times. In it are situated the Mercedes, San Antonio (Sacracancha), San Francisco, Pucara, and Rosario mines. The vein in the latter has been much worked, and produces ores of very fine ley, but it is not worked at present.

In Cerro Concuspatha there are the Señor de la Carcel and Santa Rosa mines. The latter abandoned; the former has a vein one half mètre to one mètre thick; its works extend for 90 mètres.

Vicharayoc, a cerro situated to the north of Yauli, contains the Trinidad, Noria, and Pisagua mines. In them there is a vein of argentiferous galena one mètre thick,

¹ *Manto* is a horizontal mineral deposit, without formation of veins.

² A mine is said to be in *boya* when it yields an unusually rich ore.

and lately the ore has been exported to Europe. Near Vicharayoc is the Cerro San Andrés, in which is situated the Augusto mine. Santiago, the cerro in close proximity to Yauli on the north, contains veins of ruby silver, and was noted for the rich quality of the ore produced in former times. In it are situated the mines of San Pablo, Santa Elena, and Talisman. The two former are not worked; in the latter works of very considerable extent and cost have recently been made. The ley of silver is from 0.25 to 1 per cent.

There are also the mines—San José, situate in the Cerro Siripata, in the neighbourhood of the town of Huaipacha, distant 30 kilometres (18½ miles) from Yauli, and San Juan Bautista, near the river Pallanza, situated 80 kilometres (49½ miles) to N.N.E. of Yauli—which possesses an establishment for refining ores by fire and amalgamation. Besides the before-mentioned mines of silver there are some which yield other minerals—copper, cinabar, sulphur, coal, salt, &c. The coal mines of most importance are those of Santo Domingo, Sorao, and Chinchu.

THE LABOUR DIFFICULTY.

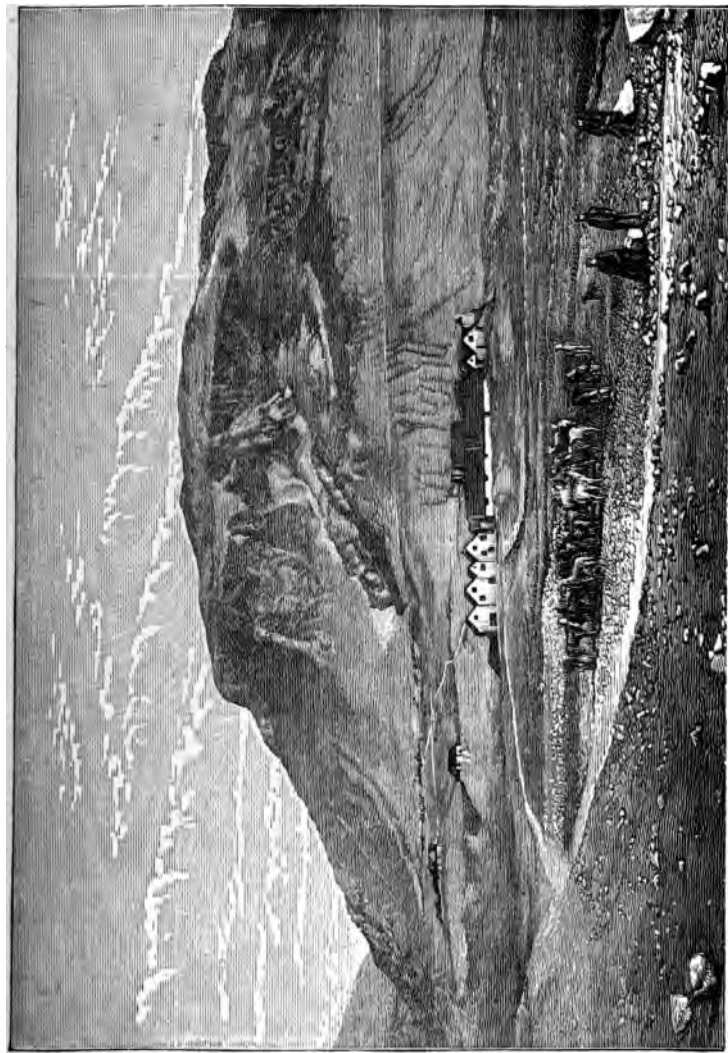
The great difficulty which hinders the development of mining in this district is the scarcity of labour, as very few of the labourers live constantly in the mineral establishments and neighbouring villages. The greater part come by contract from a distance, particularly from the populated valley of Jauja, which supplies labourers not only to the Yauli mines but also to those of Huarochiri and the sugar estates of the Montaña. The hours of labour are from six or seven in the morning to six in the evening, with a half-hour's interval at 9 a.m. and another half-hour at 2 p.m.; but generally they make two *huaraches* (night-work) in the week, in which case the people leave the mine at five in the evening, and return again at seven or eight; the same in the morning. There are workmen who ask for three *huaraches* in the week, so that they only rest twelve hours out of each twenty-eight hours of work, which

appears strange, but can be understood when the natural physique of these men is observed, aided by the use of coca. They are paid one silver sole (3s.) a day.

The workmen of the province, as they are there called, come from the Jauja valley, and generally contract for three months; almost all of them have their dwellings and land in that district, and from April to June and from October to December they attend to sowing and their harvest. This is one of the obstacles to mining; another is the rugged state of the country, and want of proper roads for transporting material.

The use of carts being impracticable, the transport is effected on the backs of animals; consequently the miners are unable to use machinery, and the expense of the conveying of coal would be too heavy on account of the great number of llamas which would be required, for in spite of the great number of these useful animals which exist in the district (the Morococha estate, for example, keeps regularly 1,000 to 1,200 llamas), they are not sufficient to meet all the requirements of the carrying of the ore, salt, táquia, provisions, &c. The use of mules is limited to transporting loads which are unsuitable in form, weight, or volume for llamas. The use of the former, however, is much more costly than the latter animals, notwithstanding that mules can be loaded with 115 to 138 kilogrammes (253 to 303 pounds) and the llamas only with 46 kilos (101 pounds).

The mines at present in actual working are proportionally few. Amongst those which have been worked with some regularity of late years are those near the pass of Paracte or Piedra Parada, the mines of the Pucara estate, the silver from which, refined on the establishment, is exported at the present time; those of the Carmen estate (close to Yauli), and the mines of the estates of Rio Pallanga and Morococha. The production in the last ten years ending 1880 may be estimated at 3,000,000 kilogrammes of argenteiferous ore, with a ley of 0.24 per cent. of silver.



OLD COPPER WORKS OF MOROCOCHA, WITH GROUT OF LLAMAS FOR CARRYING ORE.
(Engraved from Photograph.)

LIST OF ORES IN THE YAULI DISTRICT.

Gold in pepitas (nuggets) is carried down by the rivers which descend the slope of the second Cordillera towards the Montaña, viz., the Oxabamba and the Tulumayo, both affluents of the Chanchamayo. It is found in small quantities in the veins of quartz which are within the crystalline rocks of that same chain, and in the western in veins of quartz and pyrites near Morococha.

Silver (native) is found principally in the veins of Andaichagua, in specks and crystals of elongated forms called hairy silver, also in Carahuacra and Anticona.

Copper has been observed in specks of dendritic form, in the mine of San Pablo, Cerro Nuevo Potosi.

Arsenic in rounded grains, forming incrustations in carbonate of lime, is found in the mine of Elisa, Cerro Fraguamachay, on the western descent of the principal Cordillera.

Realgar (sulphide of arsenic) is found near Chaplanca, in a quebradita towards the north, in grains and *chispitas*, enclosed in a whitish argillaceous rock.

Stibnite (antimony) *maciza*, is found in large crystals in a vein near Andaichagua, accompanied with horn stone (flint.) It is found likewise in the Carahuacra vein, and crystallised in radiated forms. In the Talisman mine, Cerro Santiago, and in the Elisa mine, Cerro Fraguamachay, the aggregations measure ten centimètres (four inches) in diameter.

Molybdenite has been observed in the quebrada of Piedra Parada, on the western descent of the principal Cordillera.

Argentite (sulphide of silver) is frequent in Andaichagua, Carahuacra, and Toldojirca. In the mass of galena in the latter place it has been found in *papas* (upper oxidised ores), in pieces of eight centimètres, of irregular form, and mixed with earth in small powder. In the veins of Tarantan, to the south of Lake Huacracocha, it appears in rounded grains in the cavities of the quartz.

Galena (sulphide of lead) is one of the minerals which most frequently occur in the district, being present in greater or lesser proportion in almost all the veins and

mantos; in these it is found more or less alone, whilst in the veins it is intimately mixed in large or small particles with pyrites and zinc blende, frequently crystallised in cubical octahedral forms, both equally developed. It has been found in the form of stalactitic pipes in the Carahuacra mine, San Francisco.

Under the name of *acerillo*, the miners denote a galena which exhibits small leaves, very minute and brilliant, intimately mixed with laminated zinc blende, and which is very rich in silver; that of the San Antonio mine, Nuevo Potosi, contains eight per cent. of silver. This species corresponds to that called by Breithaupt *galena rutilante*.

In Tuctu the cavities or fissures which exhibit pyrites of the before-mentioned manto, there has been found a metal of steel grey colour and metallic lustre, crystallised in groups of tabular form, which show on the surface numerous triangular faces, and small combinations of the cube and the octahedron with truncated angles, showing serrated forms. Señor Domeyko found its specific gravity 6.46 — 6.57, and on analysis to yield :—

Lead	62.17
Zinc	16.59
Iron	1.72
Sulphur.....	18.28
	<hr/>
	98.76

This simple constitution, and its physical properties, make it appear to be a new species; it requires to be more closely studied, if it really be so.

Bourmonite (sulphide of copper, lead, and iron) is found in the Cerro of Chupra, in the district of Marcapomacocha, according to Señor Raimondi.

Alabandite, or *manganblende* (sulphide of manganese), constitutes one of the predominating ores in the vein of San Antonio mine, Nuevo Potosi, accompanied with pyrites and zinc blende, galena, and silver ore, being found there with distinct cruciform aggregations of crystallised cubes, but no well-developed crystals have been observed. They are likewise found in the Buenaventura mine (Yacumina). The miners call it *alcafor*. The analysis of a

sample from the San Antonio mine, by Señor Raimondi, shows—

Manganese	62·76
Sulphur	37·00
Silica	0·12
Iron	trace
	<hr/>
	99·88

Zinc blende (sulphide of zinc) is, after pyrites, the most frequently-occurring mineral. It is mostly found mixed with pyrites and with galena. Its ordinary colour is brownish yellow to brilliant black on a cleavage face. It is called *incensiado*. In Sulfurosa, Tuctu mines, and in the Carahuacra vein it occurs of a mulberry-colour, accompanying the rich ore of these veins. It has also been observed in well-developed crystals.

Cinnabar.—It is known only in the Pucayacu mine, in Tunabamba, in grains enclosed in white yellowish sand.

Pyrite (bronce).—It is the most common mineral; it is present in almost all the veins, silver as well as copper, mixed with other minerals, and in Tuctu, accompanied with quartz, it forms a gangue mass four mètres in diameter. It is found frequently in the gangue mass of Tuctu; they show crystals of sixteen to twenty milimètres, exhibiting the perfect cube with brilliant faces, without any combination, or the cube combined with the pyritoedre, and others forming pentagonal dodecahedrons, or by the pyritoedre with six of its edges lightly truncated by the cube. It is also found in the Carahuacra vein, as sandy crusts on ruby silver.

Peruvite (silberwismuth-glanz) is a rare mineral, discovered in Morococha, and described for the first time by Prof. Rammelsberg (1876 "Monatsbericht Academie Wissenschaften," Berlin, p. 700). It is pliable, and of grey colour, its specific gravity being 6.92; its composition, according to Professor Rammelsberg, is—

	1	2.	3.
Bismuth	52·17	49·28	49·90
Silver	25·72	25·17	26·18
Lead	2·58	8·00	4·59
Copper	0·30		
Sulphur	16·33	17·56	
	<hr/>	<hr/>	
	97·10	100·01	

The difference in the amount of lead, and the fact that the quantity of silver and bismuth change when the former increases, show that the lead does not belong to the combination, but has been mixed with it in the form of galena.

The mineral has been found in small quantity in the Matilda vein, Cerro Nuevo Potosi, accompanied with argentiferous grey copper ore, galena, pyrites, zinc blende, and quartz. Other combinations of sulphur and bismuth show themselves in the quebrada of Piedra Parada, on the western descent of the principal Cordillera.

Sulphide of Freisslebenite (antimony, silver, and lead) occurs in the San Cayetano, an old mine in Anticona, with calcite.

Pirargyrite (*rosicler*, or ruby silver).—Is very abundant, but it is found only in grains or in great and small particles mixed with other minerals; it has not been seen crystallised. In the Carahuacra vein it is accompanied with zinc blende and quartz; in the Volcan mine (Pucaurco), with argentiferous grey copper ore, galena, and quartz; in the Talisman mine (Santiago), with argentiferous grey copper ore, galena, and quartz; it is observed in small quantity in the Buena-ventura mine (Yacumina), with argentiferous grey copper ore, pyrites, galena, zinc blende, alabandite, and quartz.

Boulangerite (sulphide of antimony and lead), containing silver, is found, accompanied with galena, in Antarangra.

Tetradrite (argentiferous grey copper ore *pavonado*).—Is shown invariably to contain silver. When the percentage in silver is considerable—8 to 10 per cent.—the miners call it *pavonado fino*. It is the principal silver-bearing mineral of the Yauli region, since it occurs in the greatest number of veins, in some accompanied by other minerals—principally native silver, ruby silver, and argentite, same as in the Volcan, Santiago, and Buenaventura mines; and in other places being the only ore of value, as in the Libertad mine (Anticona), and in the veins of Nuevo Potosi. Generally it is found mixed with other minerals—pyrites, zinc blende, and galena—in beautiful crystals of the colour between steel grey and black.

Tennantite (arsenical grey copper ore, *pavonado de cobre*).—Is found in the mine of Señor de la Carcel, in the Cerro Cajoncillo, accompanied with enargite pyrites, zinc blende, galena, megabasite, and quartz, and also in

a vein to the south of the Lake Huacracocha, frequently crystallised. Professor Breithaupt has given the ore of the Señor de la Carcel mine the name of *sandbergerita*, because he found some difference in its character from that of the others. The form of its crystal is the tetrahedron combined with the dodecahedron; its cubical cleavage, hardness = $4\frac{1}{2}$ — $4\frac{3}{4}$; specific gravity = 4.369, and its composition, according to Señor Merbach :—

Copper.....	41.08
Lead.....	2.77
Zinc	7.19
Iron	2.38
Antimony.....	7.19
Arsenic.....	14.75
Sulphur	25.12

100.48

Meneghinite (sulphide of antimony and silver) is found in the Cerro Chupra, district of Marcapomacocha.

Stefanite (sulphide of antimony and silver) has been found in tubular crystals in the cavities of the quartz of the Carahuacra vein.

Polibasite (antimony, sulphur, and silver, with some arsenic and copper) occurs in tubular hexagonal crystals; it has been observed in the Independencia mine, Cerro Potosi, near Morococha.

Enargite (maciza) in cross-like forms of prismatic crystals, very distinct. It is found in considerable quantity in the San Francisco mine, near Morococha, accompanied with pyrites, megabasite, wolframite,¹ and quartz, constituting the useful mass of the vein; in the Señor de la Carcel mine, Cerro Cajoucillo, accompanied with tennantite, pyrites, zinc blende, megabasite, and quartz. The analysis of Professor Plattner shows :—

Copper.....	47.20
Iron	0.57
Zinc	0.23
Silver	0.02
Antimony	1.61
Arsenic	17.60
Sulphur	32.22

99.45

¹ Tungstate of iron and manganese.

Halite (common salt and gemma salt) is found in considerable masses in San Blas, near the town of Ondores, and in the Cerro de la Sal in the Montaña.

Fluorspar is comparatively rare in South America, and does not occur in the veins of this district, but has been found in *laques* or cavities of the limestone, in the cuttings of the Oroya Railroad, two kilometres south-west of Yauli. It occurs in these cavities in small crystals of calcite, resting upon which there has been found, in some, crystals of fluorine of 10 to 15 millimètres, the cube and dodecadron combined, with salient angles of construction cut short by a tetrakis-hexahedron, having a beautiful clear violet colour, and it is also accompanied with crystals of quartz.

Hematite (oligiste iron) has been found in small quantity in small fine micaceous iron sheets near Tuctu, towards the south-west.

Magnetic iron ore.—On the southern side of the Lake Morococha there are some veins which contain this mineral in compact pieces, accompanied with quartz.

Manganite.—Pyrolusite and other oxides of manganese enter into the composition of the *pacos*, frequent in the veins of this district, in those of Nuevo Potosí, whose ley of ordinary silver is of 0.05 to 0.20 per cent. At times this kind of *paco* has an appearance of scoria, for which it is called *paco choreado*, and contains 8 per cent. of silver.

Limonite, porous and earthy granite, is found on the surface of the *manta* of pyrite in Tuctu, and in spots on the soil in some other places, as near the lake Morococha¹ on the road leading to Yauli. It also enters, with earthy hematites, into the composition of the *Colorados pacos*, as in the Anticona veins.

Stibnite (sulphide of antimony) is found in the Carahuacra vein, accompanied with steinmannite.

Quartz (*quijo*) is almost the only gangue which accompanies minerals in the veins, being found very frequently crystallised. It is, besides, an essential component of the crystallised rocks of the Eastern Cordillera, and of the sandstones of the eastern, being shown also subordinately in the propilitas.

¹ "Morococha" means "coloured lake."

Rodonite (silicate of manganese) is frequently found in veins mixed with quartz and with rodocrosite, forming with them the gangue which accompanies the metallic ores called *quijo rosado*. This is considered as rich ore, being found associated with argentiferous grey copper ore, containing a high ley of silver.

Anfibol forms part of the propilita¹ and trachyte of the Western Cordillera, being distinguished by its beautiful crystals, that which is contained in the rock being designated as anfibolique andesite.

Asbestos is found accompanied with serpentine and dolomite in the Cerro Nuevo Potosi.

Granite, compact, opaque, dark brown-yellow colour, which changes to green and grey; it is only known in the immediate neighbourhood of Morococha, where it forms a layer of 3 mètres thick. The finer variety of granite is partly constituted by the closely-connected grouping of diminutive crystals; well-developed crystals are also found, very few being transparent. The most common forms are the dodecahedron and the icositetrahedron; likewise they present some combinations of those two with the hexahedron, and of the same with the tetrakisshexahedron. Accompanied with the granite are found calcite and quartz crystals.

Biotite (mica) in hexagonal prisms is abundant in the crystalline rocks of the Oriental Western Cordillera, and even in the sandstone and conglomerate near to Yauli, on the north.

Muscovite (Muscovy glass) is found on the crystallised rocks of the Oriental Cordillera.

Feldspar.—The constituent element of the granite of the eastern chain, of the Cordillera trachyte on the chief Cordillera, and the plagioclas (oligoclase, labradorite) of the propilite and trachyte.

Chrysocolla (silicate of copper) is found at times in the copper veins, viz., in the San Antonio mine, Nuevo Potosi.

Talc enters into the composition of the crystalline slates of the Eastern Cordillera.

¹ "Propilita," dioritic trap, composed of plagioclas and amfibol, with mica and grains of quartz.

Sepiolite (meerschau) is found in the Cerro Nuevo Potosi (Tayacasa), according to Señor Raimondi.

Glaucolite has been observed in a sandstone of the Cerro Alpamina, and in some other stratified rocks.

Serpentine is found with much frequency, forming nodules and small veins of clear grey and greenish yellow in the calcined rocks in the neighbourhood of the Morococha lake. Serpentine is sometimes intimately mixed with calcite; some of the spherical concretions present on the surface of the ground are composed solely of serpentine, the latter being found in the centre mixed with carbonate of lime. The analysis of Señor Paz Soldan shows the presence of carbonate of lime in the sample examined in this locality.

Haloisite.—Compact, of a greyish white colour, is found in the San Pablo mine, Cerro Nuevo Potosi.

Pyromorphite (phosphate of lead) is found in specks and very small crystals, accompanied with galena, in the Manto of Toldojirca. According to Raimondi, it is found in small hexagonal prisms in some parts of the Marcapomacocha district, and in the Cerro Chupra of that same district.

Mimetene (arsenite of lead) accompanies the former in the same Manto of galena, in the form of specks and very small crystals.

Nitratine (nitrate of soda, saltpetre).—According to Señor Galvez, in the *meseta*¹ of Tarmatambo, quebrada of Collana, at one league from Tarma, on the road to Jauja, there existed at the end of the past century a number of surface mines, from which the people of that district extracted saltpetre for making gunpowder. All the works were of shallow depth, not exceeding 2·50 mètres (= 8 feet), with the exception of one which reached 11·70 mètres (= 38 feet 3 inches), in which the saltpetre was found half a yard thick. Likewise in the town of Tapo, in the Acobamba district, they worked saltpetre. In Paz Soldan's "Geography," p. 245, reference is made to the first of these places, classifying the substance as nitrate of soda.

¹ *Meseta* means an elevation with a flat summit.

Megabasite, in flat or needle-like prisms of grey colour yellow to red, the surface longitudinally striated, is found in the copper mines, Señor de la Carcel, Cerro Cajoncillo, and San Francisco, near to Morococha, accompanying enargite and other minerals of said veins. They show also tubular crystals of one centimètre long and wide, owing to the predominance of macropinacoids, the surface of which is vertically striated and ends in an inclined face, or by the half macrodoma. The colour of these great crystals is greyish black, but the prisms, one millimètre thick, are half transparent, of reddish colour. They are arranged in radiated groups. It has perfect brachydiagonal cleavage. Two analyses, made in Morococha, gave the following results:—

	<i>a</i>		<i>b</i>
Tungstic acid.....	74·00	...	75·12
Oxide of manganese.....	24·51	...	23·21
„ iron.....	1·49	...	1·42
	100·00		99·75

In *a* the mineral was decomposed, being funded with bisulphate of potassa (determining the tungstic acid by difference); and in *b* the decomposition was made by hydrochloric acid. In both cases the bases predominate.

Wolframite.—In the San Francisco vein, near to Morococha, there is found, in company with megabasite, prismatic traces of wolframite, formed by the breaking up of the macro and brachydiagonal cruciform crystals. This wolframite is of opaque blackish-red colour, exhibiting a reddish grey streak, and, with borax, before the blowpipe gives the colour of iron, whilst megabasite gives a yellow powder and manganese reaction in the borax bead. Melted with saltpetre and soda, both give the same reaction.

Scheelite is shown in very small quantity, accompanied with megabasite, in the Señor de la Carcel mine, Cerro Cajoncillo.

Barytine is very scarce in this district. It has only been observed in the Señor de la Carcel mine, Cerro Cajoncillo, in very small proportion, in fine rhombic prisms of two millimètres long, white colour, or striated yellow on the surface.

Anglesite, in beautiful crystals, has been observed

accompanying the galena in the San Antonio and San José mines of the Cerro Toldojirca. It is likewise found in the Cerro Chupra mines in the Marcapomacocha district.

Yeso.—White, of saccharoidal, grainy structure, forms considerable deposits on the stratified rocks of the table-land. It is found in the Cerro Alpamina (at the south of the lake Huacrachocha), near the Oroya, at a short distance to the north of Saco, and at two kilometres from Huaipocha on the road to Tarma. Transparent crystals, of three centimètres, produced from Sincamachay, showed the combination of the prism with the chinopinacoid, the negative hemipyramid and the positive orthohemidoma forming together a pyramid with rounded faces.

Melanterite (sulphate of iron) is found in Tuctu; a powder covering the masses of the surface of the pyrites.

Calcite.—Enters into the composition of the sedimentary rocks, and as such is abundant, but as gangue in mineral veins is very scarce. It has been observed crystallised in the small granite of the neighbourhood of Morococha, and in the cavities of limestone where fluor spar is found in the cuttings of the railroad about two kilometres to the south-west of Yauli. In form of stalactite (*licamancha*) it is present at different points on the banks of the river Yauli; and in form of toba, pointed and porous (*singa*), in Yauli, Chaplanca, and Saco. Parts of pisolitic structure have been found between the *toba* of the baths of Yauli.

Dolomite is shown in the Cerro Nuevo Potosí (Tayacasa), with asbestos and serpentine, according to Señor Raimondi.

Siderite (carbonate of iron) has been found in the San Francisco and Cueva mines, Carahuacra vein, in lenticular crystals.

Rhodocrosite (rhodochrosite, carbonate of manganese) forms, mixed with quartz and rodomite, the *quijo rosado*, which accompanies the argentiferous ores of some veins, as of San Antonio, Nuevo Potosí, of Elvera, in the same Cerro, and others. In small rhomboedric crystals, of rose colour, it is shown in the Señor de la Carcel mine, Cerro de Cajoncillo.

Aragonite, in fibrous crusts of white to clear green colour, has been found in the San Antonio mine, Cerro Nuevo Potosí.

Cerussite (carbonate of lead). Its presence is frequent in the veins which contain galena. It has been observed in

beautiful crystals, accompanying said mineral, in the Manto of Toldojirca (San Antonio and Libertadora mines), and the San José mine of the same Cerro.

Malachite and *Azurite* (carbonate of copper) are regular associates of the minerals in the gangue mass of grey copper ore and of galena ; on the Manto of Toldojirca both are present very frequently, the azurite in very small crystals.

CHAPTER IX.

On the Minerals of the Ancachs Department.

Translated Extracts from the "Estudio sobre Exploración y beneficio de los Minerales del Departamento de Ancachs,"
by MAURICE DU CHATENET. Lima, 1883.¹

THE Department of Ancachs is, without doubt, one of the most celebrated for the number of metalliferous veins which traverse its mountains; and, even in the event of there only existing in Peru this single mineral region, it would be in justice considered the centre most favoured by nature, from the point of view of its valuable mineral products. The Cordillera of the Andes in general is rich in mineral deposits of all kinds, but it appears that in this Department there have been more eruptions than in other places, and this has given passage with greater facility to the different metallic emanations in that region; not only the metalliferous veins abound, but also the deposits which offer one of its richest treasures, viz., coal. In this Department there is found nearly all the ores which are utilised in metallurgy, viz., gold, silver, lead, copper, zinc, mercury, iron, antimony, &c., and, besides, numerous beds of coal. Unfortunately, the distance from the coast, and want of means of transport, prevent them being applied to a useful purpose. As in all places, gold is found in two kinds of deposits, in veins, and the old and contemporary auriferous alluvials, which can be always considered to be derived from the auriferous veins of previous origin. These veins are found in the neighbourhood of the alluvials, which have been formed in great part by the rounded stones coming from the *cajas* of fragments of quartz, and of other ores which are observed in the neighbourhood. The

¹ "Anales de Construcciones Civiles y de Minas del Perú." Published by the School of Mines, Lima, 1883.



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gold in these alluvials, or *lavaderos*, is always accompanied with magnetite, which leads to the confirmation of the idea that the gold which is met with on the surface is derived from veins, since these latter contain iron pyrites in greater or less proportion, which from analysis is known to be transformed into magnetic oxide. The auriferous veins have opened a passage in the eruptive granitic rocks in some places near the coast, in the mountains to the north of the Department, in the Cordillera Blanca, in the province of Huari, &c. These rocks differ essentially from those which are crossed by veins of silver, by the presence of either mica or quartz. They are chiefly mica, granite, and gneiss; but it is necessary to observe that these granites cannot be considered as of very ancient origin, because in them quartz is at times very scarce, and at others does not exist at all. Its structure is not very crystalline. Crystallised quartz constitutes the principal part of the material which fills the veins of gold; there can also be found in them other ores, such as iron and copper pyrites, grey copper, galena, and blende of different sulphides of antimony. In parts of the vein near the surface there are found oxidised matters, or auriferous pacos, resulting from the maximum of oxidation with the minerals existing below. In the present condition of the place, and the state in which the roads are found, it can be said with certainty that the immense riches of Ancachs lie in its numerous veins of silver, which offer to the explorers of our times and to those of the future an element of work or production of indefinite duration. As sedimentary deposits, the Department of Ancachs shows in some places those of transition—micaceous or talcose slates—lying above the granite rocks, in which there have been traced veins of gold, and which are again found on the other side of the Marañon, where deposits of gold abound; the trias (or new red sandstone) in the valley of the Marañon, where there are many springs of salt water, gives hope of the discovery of gemma salt; the Jurassic deposit, which appears to be the most interesting of these sediments by its extent and richness of ore; the cretaceous rocks above the eastern decline, the waters of which pass to the Atlantic; and the quaternary alluvial deposits.

Whatever may be the nature of the ores, they are almost always accompanied with a gangue of quartz, and are very rarely calcareous or argillaceous. Many veins are found separated from their *astiales* by *salbandas* well defined, which ought to materially facilitate the work of demolition.

From the point of view of its mineralogical composition, the ores may be divided into three great categories—pyrites, galena, and grey copper ore, according as the useful material predominates in the deposit. Besides these three principal classes, there may be added a fourth, the *pacos*, which is a product of the oxidation of the preceding kinds of ores, and which only exists in the upper parts of the veins, and then only at a certain depth.

We will here point out a very important fact, which is general in all the district,—the presence of antimony in all the ores rich in silver. It may be said that there is no silver ore of any richness which is not antimonious. There have been in the metallic emanations which have contributed to the filling of the veins, a union so great between silver and antimony, that ores which yield only antimony as the constituent metal, and which have not been found argentiferous in other parts, as stibnite, show a ley of silver which reaches at times to one thousandth. However, this simple sulphide never forms rich ore; the kinds most argentiferous are the complex and antimonious sulphides. It is in these that the function which antimony performs can be more readily perceived, and to better prove the enrichment which its presence originates. It is easily proved, that all the deposits in which iron or copper pyrites, and pure galena, exist alone, are always poor, and that they become rich when in the same vein the ores indicated become antimonious; and it is on that account that in certain veins, *tabicados* (rubannés), the present workers do not break down, and only treat the antimonial zones. This, it appears to me, is a very important observation, because it gives very useful indications in the working or in the exploitation of mines, and likewise because in that which refers to the metallurgical treatment of the ores, it will be necessary to be always taken into consideration to select the most advantageous methods.

The veins of pyrites are industrially the least worthy

interest, because they are the least rich in silver. They may contain iron or copper pyrites, and frequently both at the same time. When there are only these two metals, the richness rarely reaches twenty marcs per cajon; the same happens when copper only exists in a state of sulphide, simple or mixed with iron pyrites. At times it is sufficient, the presence of streaks of grey copper, to increase the richness very much. Certain veins contain large masses of almost pure galena; in this case, as in the preceding, the richness of silver does not exceed some twenty marcs the cajon. The galena is generally accompanied with other ores; pyrites, zinc blende, sulphide of antimony, and grey copper ore; the two latter always enrich it considerably.

Antimonious galena is always richer than pure galena, especially when it contains a little grey copper ore; in this case it is generally a little auriferous. When these two conditions are combined, the galena contains a ley of from 30 to 35 marcs per cajon, and often of 60, 100, 200 marcs, and even more, as can be seen in the veins of Huapula, near Pueblo Libre, of Huancapeti, of Collaracra, near Recuay, and of Muta-burros, on the Patara mountains, near Macate.

The richest deposits are those of grey copper ore, or *pavonado* (argentiferous grey copper ore), as the Peruvian miners call it; this ore exists in them only rarely, and is almost always mixed with other kinds, the most frequent being iron pyrites. Its ley of silver is almost always above 40 marcs, and often exceeds 80 to 100; it reaches at times 300 to 400 marcs, and even more.

The *pacos* are minerals of earthy and lithoide appearance, in which all the materials have suffered a complete oxidation. They proceed, without doubt, from the preceding kinds, and they are found in the same deposits as they are, but only in the parts near to the *buzamientos*. Knowing the nature of the ores below, it is easy to deduce that of the *pacos* on the surface. The metals are oxidised, and the sulphur has disappeared when it has not been able to form sulphates undecomposed by the heat. It is thus that iron pyrites has been converted to peroxide; copper pyrites, a mixture of oxide of iron and oxides and carbonates of copper; the galena, carbonate and sulphate of lead; anti-

mony, which yields by its oxidation an acid product and a fixed one, has formed combinations with the metallic oxides, different antimoniates, which may be observed in the pacos of the antimonious veins.

We observe that all the pacos are more or less hydrated, and that the structure of the veins in the oxidated parts has experienced incontestible changes, losing its regularity and its symmetry; the filling up has a confused appearance. The richness of the pacos is naturally in proportion with that of the sulphurated materials, which exist at a great depth, but with some exceptions it may be said to be almost always inferior

COAL DEPOSITS IN THE ANCACHS DEPARTMENT.

On the contrary to what happens in other places of the Cordillera, where the progress and development of the mining industry are kept back for want of fuel, this region is one of the richest in coal, as if nature had designed to give it, at the same time with its magnificent metallic mines, the most useful element to enable it to withdraw profit from them. This stratum of coal cannot be regarded as belonging to the carboniferous formation, properly so called, as it is found in the Jurassic sandstone, that is to say, the deposits which are richest in veins. Thus, as in the metallic mines, coal unfortunately does not exist on the coast, but all the provinces of this Department are abundantly provided with it, especially that of Huaylas, where there is a populous district, near the principal towns, and in mining districts which, without doubt, will have a great future.

The principal places of exportation of ore are from the mines of Pasacancha, in the province of Pomabamba; Cajavilca, in the province of Huari; Huallacanca, in that of Cajatambo; Huancapeti and Collaracra, near Recuay; Coyrosho, Huapula, Colquipocro, near Caraz; and Palara, near Macate.

The greater part of the mines are at a distance of one to three leagues from the river Santa, and three days by road from the ports of Huarmey, Casma, Tamanco, and Chimbote.

PROFESSOR ORTON ON THE ANCACHS MINES.

Professor Orton says :—"The most numerous and promising silver mines in Peru are, without doubt, located in the Department of Ancachs, just north of Lima; not because it is a richer region than the Eastern Cordillera, but because it is the only district which has been scientifically explored. This has been done by the accomplished naturalist, Professor Raimondi, under the patronage of Mr. Henry Meiggs. The report recently published at Lima contains assays of specimens from the most valuable mines in which the silver occurs. It appears (1.) that silver is not very common in the native state; (2.) that the minerals richest in silver are pyrargyrite (rosicler, or ruby silver), and stephanite (brittle silver glance); (3.) that the greater part of the silver, however, is extracted from tetrahedrite, galena, and many mineral oxides (*pacos* or *colorados*); the *pacos* richest in silver are those which result from the oxidation of stephanite and pyrargyrite; the poorest are found in the great part of oxide of iron, in which the silver is minutely disseminated in the native state; (4.) it is worthy of notice that the silver ores are constantly associated with antimony. Even the galenas, having a cubical structure, always contain a small percentage of antimony. In general it may be said that the silver of Peru, as of Chili and Bolivia, whether native or in the form of chloride, sulphide, or amalgam, occurs chiefly in the oolitic and porphyritic series near intrusive diorite.

"Some specimens from Ancachs show the maximum yield of a variety of ores :—native silver, with arsenuret of silver, panabasite, pyrites, and blende, 4,284 marcs to the cajon; argentiferous tetrahedrite with pyrargyrite, free from gangue, 1,966 marcs; argentiferous tetrahedrite, malachite, and azurite, 500 marcs; sulphide of antimony, silver, lead, copper, iron, and manganese, 606 marcs; antimonial silver, lead, and copper, with chrysocolla, 524 marcs; cerusite, with antimonial silver, lead, copper, and iron, 756 marcs; antimonial silver, lead and iron, with sulphide of silver and antimony, 680 marcs; argentiferous tetrahedrite, with

galena and blende, 676 marcs; malinowskite—crude, 572 marcs, pure, 1,191 marks; argentiferous antimonial silver, 312 marcs; sulphide of silver in composition with galena and anglesite, 712 marcs; anglesite, chloride of silver, and antimonial lead and silver, 560 marcs; argentiferous galena and tetrahedrite, 532 marcs; argentiferous jamesonite, 340 marcs; antimonial silver, lead, copper, and iron, with cerusite and malachite, 408 marcs.”

THE MINES OF SALPO, QUIRUVILCA, AND
HUAMACHUCO.

*Extract translated from a Report of M. D. ESTEVAR
DELSOL, dated Lima, 1880.*¹

These mines, situated in the provinces of Otuzco and Huamachuco, in the Libertad Department, were surveyed by M. Delsol in 1878.

The rocks which form the ridges, comprised between the sea and the Sierra, from Trujillo to the vicinity of Challacocha, four leagues from Otuzco, are in great part syenites. Sometimes there are found diorites on the road, called “*Siete Vueltas*” (seven turns), which follows the left bank of the river Moche, as occurs near the town of Poroto, between Trujillo and Poroto. These ridges are not very elevated until after passing Poroto, where they begin to rise considerably, and on arriving at Challacocha the syenitic ridges may be estimated at an altitude of between 2,000 to 3,000 mètres.

Before arriving at Challacocha the stratified rocks begin to appear, which form all that part of the country, and extend from that place to Huamachuco from west to east, and from Llaray to Usquil from south to north; these stratified rocks probably extend to the Marañon. The aspect of the country is worthy of notice. The traveller on leaving the syenitic hills passes through very rugged places and very deep ravines; the river runs between two rows of hills, which are so narrow that there is hardly room for its

¹ “*Anales de Construcciones Civiles y de Minas del Perú.*”
Published by the School of Mines, Lima, 1883.

channel; the altitude of these hills may be estimated at about 1,000 mètres (3,280 feet) from the level of the river. On the road from Usquil to Otuzco there is a quebrada, called Quebrada Honda (deep ravine), a name it well deserves, the mountains which form it being at the least 1,500 mètres (4,926 feet) high from the bottom of the ravine. The same configuration is observed within five or six leagues from Challacocha, between Otuzco and Quiruvilca, and there begins what is called the *jalca* or the *puna*, an elevated plain or plateau, very extensive, the elevation of which is about 3,500 to 4,000 mètres, or about 11,796 to 13,125 feet. At this place the quebradas (ravines) are seldom met with, and those that do exist are not deep, and it is difficult to meet there any regular decline whatever; a greater part of the water proceeding from the rains or springs cannot flow, and remains stationary in low places, giving origin to numerous pools and lakes.

SALPO.

The mineral deposit of Salpo contains an unlimited number of veins and fissures, of which very few are at the present time working; among them may be mentioned those of Salpo, Millhuachaqui, Salpito, and of one or two veins near Millhuachaqui. The Salpo vein is the most important vein of the country. It has been explored over one and-a-half leagues (four miles) in extent, from the bank of the river Moche, where it appears up to Cochaya, to the south-east of Salpo, where it disappears; however, at Urumalqui, two leagues beyond, another vein is met with, having the same course as that of Salpo, and the appearance and composition of which led the miners of the country to think that it is only the prolongation of the Salpo vein, so that it would thus have a known length of over three and a half leagues (about nine miles). The thickness of this vein is as notable as its length, being, at the smallest dimension, five yards, and measuring at times eighteen. The principal vein has a width of seven or eight yards, and separated from it by sterile parts are two small veins, which probably unite with it lower down. Besides, many other veins are met with, so that many miners consider this vein to be not a single vein, but a conjunction of

veins running parallel. The course is north-west to south-east, and its inclination 90° , that is to say, it is almost vertical.

The Salpo hill is situated at the limit of the stratified rocks, and is formed of the green sandstone on the surface; below follows the Alimosca (so called from its porphyritic-looking rock), with an eruptive appearance, very characteristic; and, lastly, the syenite, in which the various mines are situated below that of Salpo, the veins of which we will speak of hereafter. The nature of the ore varies with the depth; on the surface the small quantity which was taken out at the commencement of the working of the Salpo vein contained a considerable amount of gold, for which reason alone they only refined this metal; but soon afterwards the quantity of gold diminished, whilst that of silver rapidly increased, so that the miners refined the latter metal. The ore which replaced the *paco*, contained in great part quartz with copper pyrites, or sulphate of copper simple or complex, the gangue being always very abundant in the principal vein. Sometimes in the sterile parts are found some small veins, very rich but very narrow, it being always observed that the narrow veins are usually much richer in silver than the broader ones; generally in the same vein the wide parts are richer than the narrow parts.

After the copper ores, the miners meet with, at a depth of about 40 to 50 mètres (132 feet to 164 feet), galena, which afterwards becomes very abundant. The latter being of little ley, and the miners not knowing how to convert it in the reverberating furnace, and to refine it afterwards for amalgamation, nor to refine it directly by smelting, they abandoned the mines where it appeared, as by example, that of Carabamba. By this it will be seen, as Señor Raimondi says in his work upon the mines of Peru, that the rocks which form the *cajas* of the vein have a considerable influence on the nature of the ore, galena almost always appearing in the *cajas* of the eruptive rocks. The following is a list of the mines on the Salpo vein:—

Mirador de San José.—This mine extends for 40 yards in the vein, and is 5 mètres thick. The ore was *paco*, afterwards sulphates, and finally *galena*, and yielded 6 to 7 marcs per cajon. It is abandoned.

Alta Gracia.—Worked 40 yards in the vein ; abandoned.

La Cruz.—Worked 40 yards in the vein ; width of vein, 5 mètres ; also worked in two small veins. Ore—pacos, sulphates, galena. It yields from 10, 20, to 30 marcs per cajon. It likewise yields gold, as do nearly all the Salpo ores. They extract from each cajon one ounce of fine gold, by means of grinding. By the machines, with the *sutil*, a little more is extracted. It is being worked at present in two shafts, about 60 to 70 mètres (197 feet to 230 feet) deep. The others are inundated.

La Merced.—Worked 80 yards in the vein ; abandoned. It fell in many years ago by bad working, and after the falling-in, or *sallamo*, as they call it, they continued widening and penetrating in the nearest mines. Now it exhibits a cavity of 80 mètres long, 12 or 15 wide, and 40 deep. When it fell in they were extracting ores yielding 60 marcs, but generally it did not yield more than 12 marcs. The width of the vein is 7 mètres (23 feet), and the ore is the same as that of the La Cruz mine.

Carabamba.—Mine not worked ; 100 yards in the vein. The same ore as in the above. The shaft reached water at the same time as the galena and copper were met with ; the ley did not exceed 10 to 12 marcs. It gave a regular ore, from 10 to 80 marcs, in great abundance, with parts yet richer. Width of the vein, 7 to 9 mètres ; shaft 75 mètres.

La Descubridora.—Two hundred yards of shaft in the vein belonging to Señor Solar, who is now working it. The same ore as the previous mine. They also find the *acerillo*, which they call a pavonado (argentiferous grey copper ore, with steel and shining specks), the ley rising to 50 marcs. The ore regularly yielded from 10 to 20 marcs. The shaft is under water. One working only, called the *Azules*, the ore being bluish at some 30 yards deep.

La Lumbrera.—Two hundred yards in the vein ; unworked ; under water. Ore like the preceding, but much poorer. It does not yield more than 10 marcs in the richest parts.

Portugal.—Has a shaft of 200 yards sunk into the vein, and belongs to Señor Muñoz, who for some time worked it for copper, the ley being from 15 to 22 per cent. The

ore also contains a little gold, and about 6 marcs of silver. Width of the vein, 10 mètres; tunnels, 20 mètres.

Cruñista.—Width of the vein, 10 mètres. Pacos and sulphates of 6 to 8 marcs of ley.

Near Cerro de Salpo are small mines, amongst which *La Resurreccion*, about 3 kilomètres ($1\frac{3}{4}$ miles) from Salpo, worked by Señor Huauy, contains copper ore which produces up to 100 marcs to the cajon from smelting and 75 only from crude. It is from 5 to 6 centimètres wide.

Millhuachaqui.—The Cerro of Millhuachaqui is crossed by several veins; the principal is Millhuachaqui, known for the regularity and quantity of silver it produces. Its ley gives 6 to 8 marcs. Often rich parts are found giving 30, 40, and 60 marcs. There are thirteen mines in this vein.

San José.—Abandoned on account of inundation. The ordinary ore yielded 100 marcs. It was very common to meet with the *accrillo* and the *polvorillo* (sulphate of silver), which is still found in parts where they are working. Native silver is also found, in pieces exceeding one pound in weight. It is possible that it would be profitable to endeavour to drain out the water and to renovate the mine.

La Descubredora.—Vein 2 mètres to $2\frac{1}{2}$ wide; pacos and sulphates of 20 marcs; inundated.

El Carmen.—Vein 2 mètres wide; pacos and sulphates of 12 to 20 marcs; inundated.

Concepcion.—Vein 25 mètres; pacos and sulphates, 8 to 30 marcs. Not worked.

La Esperanza.—Vein 1 to 2 mètres. Ley of ore 12 to 60 marcs. Inundated at 80 mètres from the surface.

Ell Túrgo, San Teresa, La Victoria, El Rosario, San Jeronimo, Yankee Doodle, San Domingo, and Shalgon, containing leys of 8 to 15 marcs. Not worked.

Salpito Mine.—The vein is 40 centimètres wide. The ore consists of *accrillo* and *negro*; its ley is from 30 to 70 marcs, its passages reach to 50 mètres. It is at present not worked.

Pique de Salpito.—Vein 40 to 50 centimètres; ore, black—*accrillo* and *polvorillo* (sulphate of silver). It contains gold. Its ley of silver varies from 30 to 300 marcs; that of 300 is what they call *pavonado fino*. At present they are

working a piece of ground containing an average of 150 marcs. This mine is better worked than all the others, the owner having adopted the European system. There are twelve workings, with fifty labourers in each.

Achupillai.—Separated from the others by a ravine; vein 50 centimètres, ley 15 marcs. Mine not worked.

QUIRUVILCA.

Quiruvilca is situated at the south-west of Otuzco, about 10 leagues from the town, in the highest point of the *Puna*, and near the road from Huamachuco to Otuzco. The composition of the ore is as follows:—On the surface, as in all the veins of the country, pacos are found to 20 mètres of depth; copper pyrites, with *panizo*, the name they give to the white argillaceous earth, which comes, as is probable, from the same stockwerk of the veins. Afterwards some small parts of pavonado, mixed with copper and iron pyrites. Lastly appears the pavonado, always mixed with pyrites.

The gangue is composed of quartz and of sulphate of baryta with *panizo*. Quartz is found in greater quantity with iron pyrites, whilst, when blende is shown, sulphate of baryta predominates. The miners have noticed that the sulphate of baryta is generally a good ground for silver, that is to say, the ores which contain much sulphate of baryta are rich in silver, which applies, according to Señor Raimondi, to all the Peruvian ores. All these ores are much richer than those of Salpo and Millhuachaqui. The galenas yield 25 to 30 and upwards marcs by smelting, owing to the presence of a small quantity of pavonado. Nearly all the ores contain gold, principally near the surface. Plata Pina, of the S. Andres mine, has 1 per cent. of gold. They only refine the ores containing 15 marcs per cajon.

The cerros which form the mineral deposit of Quiruvilca are the following:—The Cerro of Midipuida, with the mines Midipuida, La Peña Colorada, La Merced Grande, La Merced Chica, all working at the present time; the Cerro of Llacapucio, with the mines of San Pedro and San Pablo San Andres, San Francisco and Jesus, in actual work; the Cerro of Chonta, the Cerro of Casa Pablo, the Piedra Parada, with the mine of same name, the Papelillo, the

Cruz-pampa, the Torao, the San Lorenzo, San Felipi, San Antonio.

The vein of La Peña Colorada gives galena, zinc blende, and with pyrites and a little pavonado (argentiferous grey copper ore), 20 marcs. The La Merced Grande Mine is the most important of all. It has six workings, and twenty workmen. Its pits are 70 mètres deep, and one under water. The mine is drained by two tunnels. The ore is pavonado (argentiferous grey copper ore), with zinc blende, and yields, on an average, 40 marcs the cajon. San Andres gives 30 to 35 marcs on an average. A sample of good ore from this mine has given by the Coppel test as much as 190 marcs per cajon.

The Papelillo ore yields 20 to 25 marcs. All the veins are narrow, with few exceptions, seldom exceeding 40 centimètres wide. The greater part of the mines are not deep, on account of water appearing very quickly; without doubt the water could be easily drained, as Quiruvilca is situate in the highest part of the Puna. In summer the mines are almost dry, and many which in winter are not worked have workmen in them in summer. With simple machinery all could be drained, but as there is such an abundance of good ore, nothing is more easy to commence a new mine when one is charged with water; it is for this reason we see so many mines abandoned.

THE GOLD MINES OF HUAMACHUCO.

Huamachuco.—The veins in the neighbourhood of Huamachuco are very numerous, and the mines of this province yielded much gold in the time of the Viceroy. At the present time, in the neighbourhood of the town, there is no work going on, except in the Cerro de Toro. This Cerro is situated about one league (three miles) from Huamachuco, towards the Marañon, and consists of two distinct formations; the south-west part is formed of sandstone quartz, it is the least in altitude and extent; the other part, towards the north-east, is formed of green sandstone, which has the same appearance as in Quiruvilca, so that in this cerro the separation of the two classes of rocks is clearly seen, which can be observed as far as the Cerro Negro, and even farther. It is necessary to study with some

attention the aspect of the country, and compare it with that which is observed in the Puna, to be able to affirm, as we have done, that the quartz is anterior to the green and purple sandstones. Up to the present time the Cerro del Toro mines have only produced gold ; but it is probable that if the work is continued silver ores may be met with, because there, as in Salpo, it happens that the auriferous pacos which are found on the surface are replaced by degrees by pavonados (argentiferous grey copper ores), or sulphates of other metals. In the part of the cerro containing quartz the auriferous paco forms three very distinct veins—two near the extremity, and the third towards the interior, near the separation of the quartzose and green sandstone. Besides the veins, there are *hilitos* (small threads), which cross them but have been but little worked. The direction and inclination of the veins are the same as that of the *capas* (stockwerk) of the rock, so that they may be called *vetas-capas*. The direction, east and west, is pretty regular, but the inclination varies at each moment. The width is half a yard, on an average. In the part of the cerro where the green sandstone is found, it cannot be said that the veins are well formed, the rock being traversed in all parts by numberless *hilos* (threads), fissures, and small threads, forming a vast network which completely covers it. Some of them have a regular ore, but are generally poor, the ore being found good only in the points where the veins meet ; but the threads and fissures being so numerous, the points of meeting are also plentiful, so that the conjunction gives a very good ore. Some of the threads are a little wider than the others, measuring five and sometimes ten centimètres (four inches), in which case the inclination and direction is generally more regular. There are two mines in this cerro at present working ; one in the sandstone quartz, which follows a very narrow fissure of one to two inches wide, and the other in the green sandstone, which follows a pretty regular fissure about ten centimètres (four inches) wide. In the former the paco disappears, and has been replaced by pyrites and pavonado (argentiferous grey copper ore) ; at the same time the fissure has become wider, measuring ten to fifteen centimètres, and affording pyrites with spots of pavonado and

specks of *polvorillo*. In the latter almost the same thing has occurred. In the shafts the pavonado begins to be visible, with copper pyrites as the paco diminishes ; these ores are found in the cajos, which are mineralised, but it is probable that afterwards all the fissures may have filled, it being possible then to work it for silver.

The greater part of the gold produced in Huamachuco comes from the Indians, who occasionally refine the ore, and extract sufficient gold to enable them to buy aguardiente and get intoxicated. The Cerro Negro is traversed by numerous veins, the tracings of which are seen in the slopes and on the summit of the cerro. We have already said that its composition is the same as that of the Cerro del Toro—that is, sandstone quartz on the west and green sandstone on the east.

The veins have galena and pavonado, but the pavonado of the Torro Cerro is a lead pavonado, and very difficult to refine, as we have already said referring to Quiruvilca ; it is crude, principally on account of the quantity of lead and antimony it contains, and although at times it is very rich, the miners do not derive any benefit from it.

M. Delsol visited two pits, the first situated upon a vein, the course of which stands north and south, 80° to the east. It is very extensive, its inclination being about 45° to the south. They call it Colpa Blanca. A paco was worked upon the surface, and afterwards a pavonado, the ley of which produced 130 marcs by Cupelation. It was abandoned, water having been met with.

The other pit is La Gedinda, the direction of which is north-east to south-west, with an inclination of 75° towards the north. This vein yields a lead pavonado, the ley of which is 150 marcs per cajon, according to the miners of Huamachuco. Not being able to extract more than seven to eight marcs by amalgamation they abandoned it.

In the Tambello mine, situated on the Tambello Cerro, at 45 miles to the north-east of Salpo, three very narrow fissures of pavonado ore were worked, but very rich, their width not exceeding 5 to 6 centimètres ; the cajas being very hard, the working is difficult and costly ; however, the ley of the ore is very considerable, yielding 400 marcs per cajon, permitting the payment of all the expenses.

Joined to this mine there is that of Chinchin, also pavonado, 40 centimètres (16 inches) wide, with a ley of 120 marcs.

In Igre is situate the Milagro mine, which has given a metal of 360 marcs.

In Aguiñuay, two leagues from Santiago de Chuco, there are many galena mines of 80 marcs and 50 per cent. of lead. Two are at present working; the ore is refined in reverberating furnaces.

In Cochaída, 4 leagues from Quiruvilca, there are some pavonado mines of 120 to 130 marcs, which belong to Señor Calinge, and are being worked.

On the road from Quiruvilca to Llaray, on arriving about half way, there is a cerro of sandstone quartz, already mentioned, called the Pederal, where gold is found in considerable abundance with the paco; there are various excavations in this cerro, but all abandoned on account of the very hard rock.

COAL MINES.

Coal is very abundant in the province of Huamachuco. There are numerous beds of this combustible of considerable thickness found in the sandstone quartz.

There are seven or eight beds of coal at present worked, and those known are much more numerous. Near Huamachuco there are two mines worked which are $1\frac{1}{2}$ metre and 2 mètres thick respectively; in Llaray, the stratum which produces coal is in its narrowest part 4 mètres thick. Near the Victoria smelting works coal is mined for smelting the ores.

In conclusion, it may be said that there is more coal in the province of Huamachuco than the whole of Peru could consume in a thousand years; consequently, it is not the difficulty of finding fuel, but of finding a method of refining, in which coal can replace such expensive articles as quicksilver and salt.

CHAPTER X.

The Gold Mines of Peru.

THE wealth of Peru has always been proverbial in precious metals, and, with regard to gold, it is sufficient to consult the ancient historians to gain some idea of the quantity of this precious metal, the existence of which was shown by the many objects of art which were found in the temples of the Incas at Cuzco, Paccha-Cámac,¹ and other places at the time of the Conquest, and as also by the large amount of gold which the unfortunate Inca, Prince Atahualpa, gave for his ransom at Cajamarca.² Gold is found in almost all parts of Peru, in the low lands as well as in the high peaks of the Cordilleras.

THE GOLD MINES OF CARABAYA.

The provinces of Carabaya and Sandia, situated in the department of Puno, in the elevated regions of southern Peru, are both exceedingly rich in gold. The following extracts from Professor Raimondi are, by his permission, translated from his treatise on the "Minas de Oro de Carabaya," published in the "Anales de Construcciones Civiles y de Minas del Perú." (Lima, 1883.)

The discovery of gold in Carabaya is attributed to some Spanish fugitives from the armies of Pizarro and Almagro in the days of the Conquest, who appear to have been the

¹ Paccha-Cámac signifies "He who created the world out of nothing," from *paccha*, "the earth," and *camac*, the present participle of *caman*, "to produce something from nothing." The doors of this temple were of gold, richly inlaid with precious stones and coral.

² Prescott says, p. 3. vol. ii. :—"The amount of gold the Spaniards took from the Incas was three and a half millions sterling."

founders of the opulent town of San Juan del Oro. In the year 1553 the discoverers carried to Spain as a present to the Emperor, a large nugget of gold in the form of a horse's head, weighing 4 arrobas (100 lb.), which was found in the first washing place at Inahuaya.¹

Writing in 1553, Ciezo de Leon speaks of the gold of Carabaya in these terms:—"In the Serrania mountain is situate the renowned and exceedingly rich river Caruaya, where in former years more than 1,700,000 dollars of gold was extracted."² It was in 1849 that the cascariilla gatherers discovered large deposits of auriferous earth in the Quebrada of Challuma, situated on the river Huari-huari, which lower down its course bears the name of Inambari, and receiving all the rivers of the province of Carabaya and Sandia, flows into the Beni. The river Challuma takes its name from the point of its fall into the Huari-huari, up to a place called Quimsamayo, distant a little less than three leagues, at which place the river Challuma is formed by the union of three streams—the Chaupimayo, the Quimsamayo, and the Pucamayo. All the auriferous deposits discovered in 1849 and 1850 were in the Quebrada of Challuma, and its affluent, the river Pucamayo. The names of the places where gold was found, are:—Pusupunco, San Simon, San José, Cangali, Cementerio, Alta Gracia, from which Señor Don José Poblete extracted an immense quantity of gold, obtaining 43 ozs. from a single trough of 15 lb. of earth; and lastly, Quimsamayo, where gold was discovered in 1849.

The places where gold was found in the Quebrada of Pucamayo are:—Natividad, situated near the union of the Pucamayo with the Chaupimayo; Tablahuasi, a short distance above Natividad; San Pedro, at two cuadras above Tablahuasi, from which Señor Don Miguel Arias extracted a nugget weighing 27 ozs., and from one trough of earth 3 lb. 5 ozs. of gold. Further above are Santa Fortunata and Mercedes; in the latter Señor Rodriguez found a nugget weighing 40 ozs.; Media Luna, which produced a nugget of 29 ozs.; Puerta Libre, Rosario, where Señores Carpio, Teran, and Lira found a nugget weighing 36 ozs.; and

¹ Cosme Bueno—"Ephemeride, del año 1768,"

² Ciezo de Leon—"Chronica del Perú," cap. cii.

lastly, Carrizal, which also yielded a quantity of gold. Less than a mile distant from Puerta Libre, is the Cerro de Ccapac-orcco, or Montebello, where gold is found in veins. An immense deposit of auriferous land extends three leagues from the hills of Comuni and Ananea to the Potro. All the deposits of auriferous earth lie upon slate and sandstone, which are generally disposed in vertical layers. No machinery has been brought to bear upon these mines, owing to the difficulty of transport; they are worked in a very primitive manner, viz., by the quimbalete, which consists of a kind of mill formed by a large stone, with a cavity in which they crush the ore by means of another stone, which is usually put in motion by means of the feet. The difficulty which exists for crushing the quartz is so great that the miners prefer to extract the gold from the alluvial soils, the working of which is much more simple, and it can be carried on a large scale, when a considerable quantity of water is used.

The following is the method of working gold from the ancient alluvial soils in the province of Sandia. When a deposit of auriferous earth is discovered, or, as they call it, *rebosadero* (an older alluvial deposit), which is not always easy to find when the land is covered with a dense vegetation, the first operation which has to be performed is to remove the *carga*, that is, the part formed of earth and sterile stones, which covers the auriferous deposit called *venero*. As the *carga* is at times more than 50 mètres (164 feet) thick, it is necessary to employ a convenient method to get rid of this immense deposit of useless soil. For this purpose water is conveyed by means of an aqueduct from a river, situated at a higher level. The water is, by means of the aqueduct, stored in a pond, to which they give the name of *cocha* (which in the Quechua tongue means "lake"). This *cocha* is provided with a flood gate, to open and let out the water as required. When the gate is opened the water rushes forcibly upon the ground, carrying away with it a large quantity of earth and stone.¹ Men with bars break up the soil, to facilitate its being carried away. These operations are continued until the

¹ A method used largely in California, where they make high reservoirs, with flood gates, and wash down sections of mountains,

auriferous ore layer is reached, which is recognised by the appearance of stones, bearing margajeta and huincho (iron pyrites and oligist).

GEOLOGICAL FORMATION OF THE GOLD REGION.

The predominating rocks in all the Nevada Cordilleras, which traverse the provinces of Carabaya and Sandia, and the ramifications of this great chain which form the numerous quebradas of these provinces, are argillaceous talcose slates belonging to the silurian formation. These rocks are found in an upright position, standing on edge, varying very much as to their direction and inclination, but generally almost vertical, rising at times like gigantic, sharply-cut walls. A very noticeable example of this disposition of the layers of slate is observed about a mile beyond the Tambos of Pucaruma, on the road from the town of Quiaca to the Quebrada of Tambopata, where the rock is in the form of a vertical wall over 150 mètres (492 feet) above the ground. These slates, in many parts of the Crucero road, to the mines of Challuma, are more or less metamorphosed, that is, they are formed by the injection of silica into them, and do not show that laminated structure which generally characterises them. The most notable example of the metamorphism of the slate is observed in a pass. situate at two leagues distant from the town of Phara. In this place the slate, without losing its stratification, shows an almost crystalline structure, with grains of quartz and feldspar, and laminæ of mica; so that it forms an intermediate link between sedimentary and crystalline rocks.

The most common phenomenon which the slates in the province of Sandia and Carabaya present, is that they are found in distinct connexion with the veins of quartz, more or less auriferous, as can be seen between the Tambos of Uco and Huaturo, between Phara and Humabamba, in the Cerro de Ccapac-orcco, or Montebello, in the Cerro Ananea, near Poto, &c. &c. Slates are not the only sedimentary rocks present in the auriferous region of the province of Sandia, but there is also observed a species of grauwaack and old sandstone in distinct

colours, varying from white to yellow, and red, and large deposits of earth débris. The sandstone resting on the slate is commonly presented in vertical layers, more or less metamorphosed. The principal places in the province of Sandia where the sandstone appears are near the Tambo of Uco, and a league below Uco on the road from Phara to Challuma, also a mile below the town of Sandia; and near the river Huari-huari, in the great valley, in the vicinity of the town of Poto, and near the lake of Comuni, at the foot of Cerro Ananea.

The alluvial earths under consideration are the most important, since it is from them that nearly all the gold has been extracted. Almost the whole of the enormous quantity of gold which the province of Sandia (formerly Carabaya) has produced has been obtained from the alluvial earth. These lands divide themselves into ancient and recent alluvial deposits. We may classify amongst the former the great deposits of auriferous earth formed in remote periods, and which are now found at a higher level, above the present beds of the rivers; and amongst the latter, the débris which the rivers and lakes deposit at the present time.

It is from the ancient alluvial that the precious metal is extracted in the neighbourhood of the celebrated villa of San Juan del Oro, in the old mining district of Aporoma, situate between the rivers Machica-mani and Pulipuli, in the districts of the Quebradas of Challuma and Puca-mayo, and they are also still extracting at Poto. All these deposits of auriferous earth rest upon slate and sandstone, which rocks are generally found deposited in vertical layers.

To form an idea of the origin of these rich deposits of auriferous earth, it is necessary to suppose that in some localities, as can still be observed, the layers of slate had a transverse direction to the quebradas, thus forming a dyke which held back the water from a great extent of country, forming in this way a great lake, whose waters rose to the summit of the natural barrier. The river which carried along in its current the gold and stones contributed its waters to this lake, which, by the action of the water, loosened the veins which were found in its course. The gold, with the stones and the earth, entering the lake, were deposited at the bottom according to the order of their

density, so that the precious metal went, by degrees, accumulated at the bottom of the lake, at the same time as the earth and rounded stones were again filling the cavity. Later, either by the continual erosion of the water above the layers of slate which were forming the transverse barrier, or by an accidental cause which might have broken the natural dyke, the water of the lake found an escape and left dry the great deposit of earth and gold which had accumulated at its bottom. If, now, the water of the river which flows down the quebrada, passing over this great deposit, should go on excavating in its course, the continual action of the water will cause it to wear itself gradually deeper until, reaching the naked rock, it will form on one side, or probably on both sides of the quebrada, a deep fissure of auriferous earth above the actual level of the river, as those which have been worked lately on the Quebradas of Challuma and Pucamayo.

In the mining district of Poto, the deposit of auriferous earth appears to have been formed in a distinct manner, since it offers some peculiarities which have been observed, that the stones and the gold have not been deposited in water, but that they have come dragged along in the form of clay. This immense deposit of auriferous earth extends from the Cerros Nevados of Comuni and Ananea up to the town of Poto, and is some three leagues in length. This land does not possess the reddish colour which is noted in almost all auriferous lands, which is owing to the peroxide of iron. The auriferous earths of Poto are of grey colour, and are formed of quartz stones, slate, and a metamorphic sandstone, accompanied with a marly earth. If we observe the stones which form this land it is seen that they have a not very rounded form, so that we can deduce that they have not rolled much, and, consequently, the gold which this land contains has not come from very far. On the other hand, the marly nature of the land and its inclined position, and the heaps of stone which it occasionally contains, show that these have not been deposited in tranquil water. Lastly, if this auriferous earth had been deposited in water, all the gold would have been found in the bottom; here, on the contrary, it appears that they find gold, although in less quantity, also in the marly

mass, which leads us to believe that the gold and the stones were carried in a thick mass, in which they have not been able to be deposited at the bottom with facility. If to this is added that these auriferous earths extend up to the Cerro Nevados, it can be almost certain that its formation and translation is owing to inundations of thick mud, in accordance with the phenomenon of the glaciers. In respect to the land of recent alluvial, we can cite the land which is deposited at present on the shores of the river Huari-huari, or Inambri, from which is extracted every year a large quantity of gold.

Passing now to the eruptive rocks, we can say that in this region, comprising the object of our study, they are very rare. Between these rocks we ought to mention, in the first place, granite, the eruption of which is owing to the introduction of the slate of the numerous veins of auriferous quartz, although this rock has seldom issued from the surface. We can, however, cite an example of granite formation, near the Tambo of Huancarani, on the road from the town of Crucero to that of Phara.

Other eruptive rocks, sufficiently rare, in the province of Sandia, are the *porfidicas*, which Señor Raimondi has observed in one place, and this near the beautiful lake of Aricoma, on the road from Crucero to Phara, where these have been introduced between the layers of slates, so that we can see the *porfidicas* alternating with the layers of the latter rock.

As regards the trachyte rock, although Señor Raimondi has not been able to discover the true place where its eruption has been made, a sure proof of its existence in the province of Sandia is a great deposit of conglomerate and trachyte matter, which commences near Accokunca, on the road from Crucero to Poto, and extends for over two leagues. This deposit at some points has been furrowed and cut by water, giving rise to isolated masses of the most capricious forms.

WORKING GOLD IN THE BEDS OF THE RIVERS.

Although many individuals extract gold from the rivers, washing the sand in troughs,—in the province of Sandia, however, they employ for this purpose a particular method,



which is very ingenious. This method is employed in preference in the beds of the rivers Huari-huari, Pulipuli, Ccapacmayo, Pacchani, and in general on all the shoals which at times are covered with water in the rainy season when the rivers are increasing, and consists in forming on the beds of the rivers, when they are dry, a kind of paving which they designate in the country with the name of *Tocellas*. For this purpose they employ stones of medium size, that is, almost of the same dimensions as those they use to pave the streets, only they take care to select the flattest ones. These stones are placed in an inclined position, working so that one rests upon the other, in the same way of the current of the river. This disposition of the stones is indispensable, because if they place them in a contrary way they hardly obtain any gold. When the time of increase in the rivers has arrived, the water invades the beaches, flushes over this pavement, and carries with it the gold, which by its density falls in the interstices which the stones leave; whilst, if they collect the stones in a contrary way, the water charges with force in the cavities, and carries the nuggets of gold outside. The rainy season ended, the water of the river retires, and leaves a new dry bed; they then remove the pavement and wash the sand in troughs.

The Indians, who commonly devote themselves to this work, calculate beforehand, according to the extent of this pavement, how much gold they can probably collect, and it appears that in certain places they obtain a regular quantity of gold for each superficial square yard of paving. In the bed of the river Huari-huari, below the mouth of the river Challuma, they calculate the quantity of gold they can collect from these pavings at two drachms per square yard. This mode of collection of gold can be compared to a store in which they collect stones to gather gold.

GENERAL CONSIDERATIONS.

There is no doubt whatever that the earth which constitutes the provinces of Sandia and Carabaya is very rich in gold, and it is surprising that a region which in ages past has given such large quantities of the precious metal, is found to-day—with the exception of Poto—almost

abandoned. Some believe, perhaps, that the gold mines in the province of Sandia have been exhausted; this is a great error, since from whence comes the gold which is daily brought down by the rivers Huari-huari, Pulipuli, Ccapacmayo, Pacchani, &c.? It is clear that these rivers must derive their gold from the veins or from great deposits of auriferous soils; and if it is true that in the Quebradas of Challuma and Pucamayo they have only worked the deposits of auriferous earth which were found in sight, there still remain immense quantities to be worked. Thus, for example, in the old mining district of Aporoma there is yet work enough for very many years to come, and if that place is abandoned on account of the expenses required to procure the necessary water to wash the auriferous earth, this difficulty would disappear on the formation of a Company with capital, which would employ all the perfected methods which are used in the present day in works of this kind.

There has not yet been made any lengthened study of this region of Peru, and only the auriferous deposits have been worked which by pure casualty have been discovered. The veins are as yet almost virgin, and if some of them have a ley of gold—the working of which does not repay a private individual who conducts his operations on a small scale by the primitive quimbaleta—it would bring greater advantages to a Company which refines in a single day a larger quantity of ore than a private individual could crush in many months in his mill. In order that the working of gold in the province of Sandia may be effected on a large scale, it is necessary, in the first place to make good roads to permit free transport by animals, and consequent introduction of requisite machinery, as well for washing the auriferous soils as for crushing the ores. Only a person who has personally visited the interior of the province of Sandia can form an exact idea of the roads which have to be traversed to go to the Quebradas of Challuma and Pucamayo, and many people on first seeing the broken state of the ground, and the thick vegetation of the Montaña, would believe the opening of a good road impossible. However, although the ground offers great difficulties at present, the making of roads is not impossible, since all



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is reduced to the question of money. I do not doubt for a moment that with the opening of good roads, a lengthened study of the territory of the province of Sandia, and the employment of machinery, such as that which is in use at the present time in California, Australia, &c., that remote and rich region would afford remuneration for many generations, in as great quantities of gold as those which have made the name of Carabaya so celebrated.

REPORTS OF ENGLISH TRAVELLERS ON THE GOLD
MINES OF PERU.

The intrepid explorer, Doctor Edwin Heath, reports to the Royal Geographical Society:—As would naturally be expected, the streams flowing from the auriferous Andes are full of gold. In the ravine of Tipuani ($15^{\circ} 31'$ lat. and $68^{\circ} 5'$ long.) the blue clay slates associated with gold extend to the river Beni. The gold of Carabaya (lat. 14° long. 69°) has been famous for centuries, and in Marcapata is the golden hill of Camanti, about fifty miles from Cuzco. The golden hill of Camanti was first made known in 1788, and in this century Companies have been formed to work it. Next to Marcapata are the beautiful ravines of Carabaya, also famous for their gold washings, their coca estates, their coffee and fruits, as well as for their chinchona bark. But the products of the ravines and of the vast plains beyond are not confined to the precious metal. Gold is far from being the most valuable branch of their varied sources of wealth. This is the region of the chinchona bark, the richest in quinine, of the finest coffee and cocoa in the world, of many kinds of rare and beautiful cabinet woods, and of inexhaustable supplies of india-rubber.

Mr. Minchin, in a report to the above-mentioned Society, says:—In the rivers of Tipuani, Challuma, Cajones, on the Andes of Peru and Bolivia, and others which descend from the high Cordilleras, very rich deposits of gold exist, which, in spite of the rugged nature of the country and the impossibility hitherto of obtaining adequate machinery, have at all times yielded largely. The gold in this case is found collected in the "bed rock" usually met with a few yards below the river bed, and is also disseminated through strata in the adjoining mountains.

Gold deposits also exist at San Simon on the Itenez, in the hilly district of San Javari, on the right bank of the river San Miguel (lat. 13° and long. 70°), where mines are at present worked in a primitive state.

PRECIOUS STONES.

There are Jews at Santarem who go up the Tapagos river and bring down gold-dust and diamonds; the latter afford a great profit, and are chiefly found on the Sierra, which lies between the sources of the Tapagos and the Paraguay rivers, on the borders of Bolivia.

There is every reason to believe that diamonds will also be found at the sources of the Peruvian rivers which descend from the eastern slope of the Andes, so soon as those regions are explored.

The ancient Spanish writers make frequent mention of emeralds and precious stones, in the works of art made by the Incas. "The figure of the sun (at Cuzco) was engraved on a massive plate of gold of enormous dimensions, thickly powdered with emeralds and precious stones."—"Cieza de Leon Cronica," cap. xliv., xcii. "Sarmiento Relacion MS.," cap. xviv. "There were (at Cuzco) a large quantity of vessels of gold and of silver, and emeralds, vases, pots, and all sorts of small vases, all of fine gold."—"Sarmiento Relacion MS.," cap. xxiv. "Emeralds they obtained in considerable quantity from the barren district of Atacama. They had turquoises also."—Garcilasso, "Com. Real," Part I, lib. viii., cap. xxiii. "The clothes of the Inca nobles were made of vicuña wool, some embroidered with silver and gold, others with emeralds and precious stones."—"Cieza de Leon Cronica," cap. cxiv.

THE MINING LAWS OF PERU.

The mining laws of Peru were reformed by a new law passed by Congress, January 12, 1877, which reformed the old laws very considerably, establishing a new basis for mining property, and introducing other important reforms for the protection of this industry. The mining laws of

various nations were studied, and the new laws were, in part, based upon the law at present in force in Spain. The new laws are thus laid down :—

Art. 1.—Creates a tax of 15 soles (6s.), paid half-yearly, for the possession of each holding of mines.

Art. 2.—This tax extends to coal and petroleum.

Art. 3.—Declares this contribution not to exempt mines, although they may be surface mines or other works which, according to the law, may be permitted.

Art. 4.—Declares that the tax has to be paid to the officer indicated by the Government, that is, the Treasury.

Art. 5.—Prescribes that the punctual and continual payment of the tax is essentially requisite for the possession and legal proprietorship of the mine, if worked or not. He who ceases to pay it half-yearly loses indefeasibly his right.

Art. 6.—The possession of a mine is rendered void if it happens that it is lost through its owner having failed to pay the tax.

Art. 7.—The Judge will not furnish recourse to opposition to the petition for a mine, if that recourse is not accompanied with proof of the opposer having paid the tax in the last six months.

Art. 8.—All right of property is indivisible for the payment of the contribution.

Art. 9.—Enacts that each one of those who litigate for a mine must pay the tax integrally, and that he who does not pay it punctually loses his right.

Art. 10.—The payment of the tax is to commence, as in effect it did commence, from the 1st of June, 1877, to be confirmed in future in the two latter months of each half-year, without adjournment being allowed.

Art. 11.—Disposes that the funds proceeding from the tax be applied,—1st, to the special School of Mines; 2ndly, to the support of a special body of mining engineers, who may lend their services at the deposits; and, 3rdly, to the general encouragement of mining.

Art. 12.—Prescribes the proceedings that owners of mines have to observe to register their titles, from the date of the commencement of the law.

Art. 13.—The territorial deputations will keep a register of mines, in which an account is kept of the titles they issue.

Art. 14.—The copies of the titles issued by the delegates will be remitted officially immediately to the Direction of the Administration of the Ministry of Finance, which is the central office, to take integral account in another register. The copies are archived, and a receipt given to the interested party.

Art. 15.—The Direction will form a padron-general or Register, divided into mineral districts, in which will be inscribed,—1st, the name and kind of the mine; 2nd, the name of the proprietor; 3rd, the number of holdings of each; and 4th, the contribution which he has to pay.

Art. 16.—This padron is published in Lima in the months of March and September of each year, and in April and October there are remitted officially to the prefects, sub-prefects, and territorial dignitaries, the necessary copies of the part which corresponds to his territory for its publication in the Departments. The padrons are renewed in this way every six months.

Art. 17.—In the half-yearly padrons the mines whose owners may have paid the tax in the last half-year, are only recorded according to the report of the receiving office of the claims newly adjudicated.

Art. 18.—The receiving offices will remit to the Direction in February and August of each year a report or account of the properties which may have paid the tax in the previous half-year.

Art. 19.—Those who may not have paid in the previous half-year lose their property absolutely, which may be applied for by others, without the last possessor being able to oppose.

Art. 20.—The judges of the first court exercise in their own provinces,—if there be no territorial deputies,—the administrative and judicial functions of these provinces;

Art. 21.—In which case none of those functionaries can exact for the duties they perform beyond the place of their residence more than 10 soles for all expenses in the first league of distance, and 2 soles for each extra league, it being understood for one single league the going and return. The clerks will receive the half of this sum, and experts what they stipulate with the interested party.

Art. 22.—Though strangers can acquire and work mines in all the territory of the Republic, enjoying all the rights and remaining subject to all the obligations of the natives respecting the property and workings of the mines, they cannot exercise judicial functions in the government of the mines.

Art. 23.—Building-stones, sands, chalks, clays, slates, and similar materials, belong to the proprietor of the land, and their working is not subject to the mining laws. In the lands of that State or of the municipalities their use is common to all, excepting the contracts made for the latter with any particular.

Art. 24.—The engineers appointed to the mineral districts are obliged to dictate a practical course of subterranean works, and the building up of the mines; to make master miners act according to the direction of the School of Mines.

Art. 25.—This law does not include saltpetre mines.

Arts. 26 and 27 enact that a law be dictated, and the resolutions necessary for the carrying out of this law (as in effect has been afterwards done), be drawn up, and the laws which are contrary to it cancelled.

II.—COAL AND PETROLEUM MINES.

With respect to these mines a special law was dictated on the 17th of April, 1873, which is still in force. Its principal dispositions are reduced to this :—The acquisition of holdings is free and gratuitous for natives and foreigners in the lands of the State; it is likewise the same in the communal lands, but by paying to the municipality the rates for the superficial land occupied; it is equally so in the case of private lands, by paying to the owner for the superficial land and the damages. The extent of the holdings in this class of mines is from 40,000 square mètres upwards, and should not be less in width than 40 lineal mètres. Companies legally organised can be possessors up to five holdings, and even ten if they were the discoverers. The holdings which, after one year's possession, are not found in active and regular work, are liable to be dispossessed, and cannot be possessed again by the same persons. In other respects these mines follow the ordinary regimen.

In all classes of mines a person or Company can possess whatever number of holdings he may please, by private title of purchase, gift, or inheritance, beyond those which they are entitled to hold according to the laws.

III.—MINERAL SUBSTANCES SUBJECT TO MINING LAWS.

Respecting the laws which have been set forth in the preceding pages, it is intended that the working of all kinds of mineral substances be subjected to the mining laws, with exception of lime, clay, colouring earths, marble, and all those used for building purposes.

Art. 22, tit. 6, of the Decrees gives a very clear explanation upon this point, and lays down that one can discover, register, and petition before the Deputies, not only for lands producing metals, but likewise for those containing precious stones, half metals or metaloids, gemma salt, fossils of all sorts, and even bitumen and asphaltic rocks. There are, however, various distinctions to be made.

IV.—QUICKSILVER, SALTPETRE, NITRATE OF SODA, BORAX, SALT, AND PEAT AS REGARDS THEIR CONNEXION WITH THE LAW.

Quicksilver, which was reserved by the Spanish Government when they published the Laws of 1811, is now free to be worked for trading purposes, and it is now on the same footing as the other minerals as to the mode of possessing them.

Saltpetre (nitrate of soda) and Borax (borato de cal), are monopolised and declared fiscal property. All discovery, then, which may be made of these substances, should be announced to the Government. Formerly the possession of holdings of nitrate of soda and borax was made before the Mining Deputies; but the abuse and concealment which was made of all the nitrate of soda lands by covetous and untrustworthy speculators, by favour and condescension of the functionaries, brought about the Government prohibition to concede new holdings, even before having decreed the monopoly.

Touching Guano, which, although a fossil substance, is not mineral, it is not, nor has it ever been, subject to the mining laws. It is subject, like nitrate of soda, to

the monopoly of the Government, and it is the practice to concede to the discoverer of new deposits a premium more or less considerable, according to the importance of the discovery.

Salt was formerly reserved by the Spanish Government. Although by Art. 15, tit 13 of the Decrees it is declared that salts of all kinds can be discovered and claimed by any person, it provides likewise that this should be brought to the knowledge of the Government to determine as to the working, refining, distribution, and price of the salt, in order not to prejudice the revenue. The country being emancipated in 1821, there was promulgated two years afterwards the first political constitution of Peru, in which all prohibitions were abolished. Notwithstanding what has been laid down by the Decrees respecting the possession of salt mines, and that there are examples of petitions being lately made of this class of holdings before the Deputies, at the present time the salt mines are subject only to the municipal regulations, the corporations of which permit the free traffic in them through their respective territories, collecting only a small duty for each arroba or stone of salt extracted, with the object of being able to maintain the deposits in a good state, order, and preservation. Notwithstanding, there are some salt mines in private lands, whose owners work them without either the Ayantamientos, or any person whatever, throwing the least obstacle in their way ; which proves that, in spite of what is laid down in the Mining Decrees, the general opinion of the country is that the salt mines are the property of the owner of the soil. There are persons who think that salt ought to be reserved by the Government, as is the case in some European states, as that no one better than it has the means of preserving the good condition of the salt mines, and of working them and distributing the article according to the demands of the towns. We do not participate in this view of the case, and we have faith in the principle of absolute liberty to legitimate industries ; because only in the seat of liberty, flourish work and industry, and whatever restriction is placed upon the working of them, beyond the exigencies of morality and public health, only serves to drive them off from the road of prosperity.

As regards Peat, a half fossil and half vegetable fuel, there has been nothing prescribed by the law in a definite way. The Mining Decrees can classify it amongst the bituminous substances mentioned in Art. 22, tit. 6, as science classifies the peat amongst the mineral fuels; but on no occasion have persons taken possession of deposits of peat in conformity with the mining laws; and their ownership has, by custom in Peru, been held by the owner of the land. In the interior, that is, in the regions of the Andes, it is almost the only fuel which exists, of which certainly no one would pretend to deprive the proprietors. And, moreover, the species of peat which we possess (*champa*), not being a product of the subsoil but of the surface, which commonly serves for the sustentation of the flocks in certain seasons, ought to be always considered as part of the property of the soil.

V.—THE TAX OF FIFTEEN SOLES, AND ART. V. OF THE
REFORM LAWS.

As regards the tax of fifteen soles, it has been calculated in the just proportion suitable to the exigencies of the country, so that it may not be very irksome for the miner, who works his holdings with more or less profit, nor remain to be a heavy charge for him who does not work his mines, but contents himself with the vain title of holder, withdrawing himself to the active work of other industries.

The part in the law of reform which alarmed the miners of the country most was Art. 5, by which it is permitted to keep the ownership of a mine, *although it be not worked*, so long as the half-yearly tax is paid. They said that this was to annul those mines, since it kept them from being worked, and making any production. The force of this argument was, without doubt, more apparent than real; because in a country like Peru, where there is a scarcity of industries and labourers, where the mines are counted by thousands and miners by tens, it is rare that a mine not worked by its owner may have sufficient importance, that others may have the desire to undertake the working of it. In all cases those examples are exceptional, and by them ought not to be judged the established principle of keeping

the possession of a mine, *although it be not worked*, so long as the owner pays his contribution. If the opposite system were adopted, besides that the measure would be ineffectual in the sense of increasing the production, there would likewise be lost the fund which the tax now produces, which is so useful to the general interests of the mining industry by the seasonable application which law gives it. It is not difficult to agree upon the working of a mine with the owner, which is a mine not worked, since the desire to derive some profit from it will make him accept equitable conditions, if he has confidence in the carrying out of the new undertaking.

Our opinion would be different if it treated of a populated industrious country, and one less abundant in mines than Peru, since in the former case all would be worked, as with abundant capital, the power of working, and other elements, nothing would be wasted. It would be prejudicial to keep the proprietorship of the mines in inactive hands by the petty interest of a contribution. This situation is not yet ours ; if it will fortunately come later on, then there will be a suitable innovation made.

THE ADVANTAGES WHICH THE MINING LAW OFFERS.

From the examination of our mining laws, there result the following facts :—

1. That the working and possession of mines in Peru is entirely free for natives and foreigners, without other obligation than the tax of fifteen soles half-yearly paid for each holding.
2. That the punctual payment of this contribution, being once made, and registration of the title or adjudication having been effected, secures the mining property from all usurpation, and even from all contentious litigation ; since against the certificate of payment nothing can be objected, neither has the judge even power to admit an objection.
3. That the administration of justice in mining matters is summary, and founded on good faith, to suit the requirements of commerce.
4. That the administrative faculties imposed upon the territorial Deputies, amply provide for the good govern-

ment of the works and the preservation of order in the deposits.

5. That the country is solidly established in mining instruction by means of the special School of Civil Construction and of Mines, which is the best institute of its kind in South America ; that the legal proceeding to examine and possess mines is exceedingly simple, and of little cost, since the law has fixed even the price which has to be paid for the journey of the functionaries who are engaged in these duties.

PROCEDURE FOR THE OBTAINING OF TITLES.

Supposing that a foreigner resident in Peru wishes to acquire and work mines, the first thing he has to do is to inform himself of the situation of the principal mining centres, of the quality of the mines, and conditions more or less favourable of the place. This point decided, and the mineral selected in which he wishes to undertake his workings, he should examine in the official newspaper for the last padron published, in order to satisfy himself which are the mines in that place which have ownership. Established there, and knowing already the properties which are legally owned, it is easy to examine those that are free, and possess that which suits him best, by means of an application in the form we have detailed in explaining the laws. The Judge, or the Deputy in the absence of the former, delivers his order for possession, ordering the same to be published ; a pit may be opened or a working may be washed, according as it is a new or an already worked mine, and the hills are cited, if there are any. The pit opened or the works prepared, within ninety days in the first case and sixty in the second, the Deputy proceeds with the interested party, the clerk, and engineer or expert, to the site of the mine, recognises it, measures the property, gives possession, and fixes the stakes or boundaries. These steps being taken and registered in the proper book by the clerk, who makes an extracted copy of the principal parts at the expense of the interested party, the Deputy remits it by post to the Direction of the Administration for official registration, and to inscribe it in the padron of mines. The original title remains in the possession

of the owner for his security ; should it be lost, or he does not wish to take out a new copy at the Deputy's office or at the Direction, it is sufficient, with the padron published twice yearly, for the security of his property.

RESPECTING MINING LEGISLATION.

By SEÑOR HABICH, Director of the School of Mines.

Mining property in Peru consists in the concessions that are made in superficial unities called *Pertenencias*. A mining *pertenencia* (claim), in conformity with the Mining Decrees, is a superficial piece of land of 20 to 40,000 square yards, or 13,975 m., according to the inclination of the vein. The *pertenencia* of coal, in conformity with the Law of 28th April, 1873, has 42,000 m. The old *pertenencias*, like a part of the Cerro de Pasco, previous to the year 1785, measured only 1,800 square yards, or 1,258 m. The *pertenencias* in the gold deposits,—*placeres rebosaderos*, or natural washing-beds,—have no fixed dimensions ; the State assigns them according to acknowledged conveniences.

SECURITY ENJOYED BY FOREIGNERS ENGAGED IN MINING
IN PERU.

From the Report on Mines by DR. R. M. LA FUENTI, 1883.

The insecurity and want of guarantees to foreigners in Peru, and, in general, in the South American Republics, which are so much affected by political controversies, have been spoken of with much exaggeration. This opinion, although accepted blindly in Europe by persons who do not take the trouble to inquire into the real facts, is unfounded almost in its totality. On the contrary, if any persons in Peru hold guarantees and full liberty for working, they are foreigners, and if there has been by chance any instance of offences committed against them, they have been very rare indeed, and have been effectually repressed by the authorities.

The character of the inhabitants of this country is benign and tolerant, and we are not aware of late years of any attempt being committed against the persons or interests

of foreigners, who have taken no direct or active intervention in political questions, and even if such has been the case, they have been treated with remarkable consideration and kindness. We are persuaded that there will not be found a single person who can reasonably say that his interests have been usurped, that any extraordinary contribution has been exacted of him, or that he has been directly injured in his establishment or dwelling. During vehement political commotions, all possible guarantees and protection have been extended to foreigners, whom the people have never ceased to respect and treat with regard. There is, then, not the slightest motive for fear on the part of strangers who may wish to establish themselves in our mining districts; they may be perfectly certain that they will there hold, in their persons and interests, as much security as in any other civilised country. Their own interests ought to prompt them to come, because they will find on all sides abundant mines of precious metals; and if the country is wanting in general in good roads and other necessary elements, these can be made without great difficulty up to the point of contact with the various railways, of which some are now working, and others in the course of completion.

GENERAL REGISTER OF MINES (PADRON DE MINAS)
FOR THE SECOND HALF-YEAR OF THE YEAR 1886.

TUMBES.

Mine.	Proprietor.	Number of holdings.
Petroleum	Faustino G. Piaggio	20

AMOTAPE.

Petroleum	Juan B. Mulloy y Juan B. Thorndicke ..	9
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PIURA.

Sulphur	J. M. Noriega y Gavino Menchaca & others.....	12
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TRUJILLO.

Gold and Silver...	Handforth Hope Jones	8
" "	Baltazar Remoliff y C ^a	7

HUAMACHUCO.

Silver	Santiago Calderon	1
"	Luis G. Albrech	9
"	Miguel Porturas	1
"	Nicolás Rebaza	2
Coal.....	Luis G. Albrech	1

SALPO.

Coal.....	Pedro T. Larrañaga	1
Silver	Manuel M. Quevedo	1
"	Vicente Gonzalez Pinillos	10
"	T. Fernandez Castro	3
"	Adeodato Salas	4
"	Martin Hermanos	7
"	Ricardo Martin Hermanos.....	1
Silver and lead ...	Juan Mason	1
Gold and silver ...	Adeodato Salas	2

CAJABAMBA.

Silver	Santiago Martin	1
"	José Santiago, Ricardo, Alberto, Elias y Elias y Eliseo Martin	2
"	Manuel José, Juan José y Felipe Vele- moro	9

HUALGAYOC.

Mine.	Proprietor.	Number of holdings.
Silver	M. I. Prado y José A. Goyburu	4
"	Jesús Carrera y Sra. Odiaga	2
"	Lucas Ortiz y F. Carrillo	2
"	Joaquin Bernal.....	1
"	Herrera y José C. Miranda	4
"	María Arana.....	3
"	José Mercedes Farje y C ^a	1
"	José C. Apesteguía	1
"	Francisco Santolaya.....	1
"	Joaquin Bernal.....	2
"	Frac. Santolaya y M. Imaña	1
"	Miguel Imaña	3
"	Baldomero Herrera	1
"	Gregorio Gonzalez C ^a	1
"	Eloy Santolaya	5
"	Diego Chico.....	1
"	Francisco y Eloy Santolaya	3
"	Inocencio Lavalle y Eloy Santolaya.....	3
"	M. Muñoz, sobrinos y E. Santolaya	1
"	Luis García y Stgo. Odiaga	2
"	Herminia S. de Imaña	1
"	Cárlos Van Isschott.....	1
"	José María Gallardo y S. M. Omontes...	1
"	José M. Farje y Félix J. Omontes	1
"	José M. Farje	1
"	Miguel Imaña y E. Sanchez	1
"	Mateo Gallardo y C. Prado	1
"	Executors of de Bernal y J. M. Herrera	3
"	J. M. Herrera, hermanos y Exequiel	
"	Ibañez	1
"	Oswaldo Gálvez	1
"	Agustín Iturbe	1
"	José del C. Omontes y M. Portal & others	1
"	Tomás Quevedo	1
"	Luis García y Eusebio Ascurra	1
Copper	José Lucas Ortiz	1
Copper and lead	J. M. Farje & others	1
"	Inocencio Lavalle.....	1
"	José Iné Aristi, E. Santolaya y Diego	
"	Chico.....	1
"	José Quiroz	1
"	J. Quiroz, Juan Lopez y R. Hoyos	1
"	Eliseo Muñoz	1

HUALGAYOC—continued.

Mine.	Proprietor.	Number of holdings.
Silver and lead ...	Elizeo Muñoz	1
Copper and lead...	Juan C. Muñoz y C ^a	1
Lead and silver ...	" "	3
Silver and copper	" "	3
Copper	" "	1
Coal.....	Juan C. Muñoz, N. Tello, J. Varela.....	2
"	Cristóbal Thill y C ^a	2
Gold and silver ...	C. Tillit y Van Isschott	1

CONTUMAZÁ.

Silver	Miguel de La Puente.....	1
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IIUARI.

Silver	Juan F. Remy y C ^a	1
"	Dionisio Vizcarra.....	2
"	Bar y A. Schreiber.....	2
"	E. R. Gonzalez, F. R. y Escalante	1
"	Ciro S. Hudson y Paulino del Rio	2
"	Ciro S. Hudson	1
"	Vicente Lezameta	2
"	Miguel Michelerio, Francisco Andavaca, Santiago Chena y S. Grasano	3
"	J. M. Loli.....	4
"	Rafael Solis	1
"	M. Robles Arnao y J. de Mata Ames ...	1
"	José V. Egusquiza y M. N. Jimeno	1
"	Vicente Lezameta	3
"	Ciro S. Hudson y Lizardo del Rio	2
"	Juan C. Eyzaguirre.....	3
"	José Escalante & others	1
"	L. Ames & others	2
"	Hamson Hermanos y C ^a	2
"	R. Mazzina y P. Cafferata	2
"	Caffereta, Canepa y La-Torre	1
"	Cafferata y Masini	2
"	Lutgardo La Puente & others.....	2
"	José Lagunas & others	3
Coal.....	Socd. Sokoloski y Thierry	2
"	R. Mazzina y P. Cafferata	1
Not stated	Nicanor Ariza y C. Cáceres	1
"	Compañía Minera de Quito	4
"	Agustín Villon y C ^a	1

PALLASCA.

Mine.	Proprietor.	Number of holdings.
Silver	Juan S. Bartolomé Therry.....	2
"	Clemente Claude y C ^a	1
"	Oscar Heren.....	1
"	Compañía S. Juan Limitada	9
"	J. S. B. Terry y A. Basallo	2
"	Victor Rosazza.....	2
"	Arturo Wertheman	1
Coal.....	Compañía S. Juan Limitada	2
Gold	Toribio Alvarez	1
Gold washing.....	"	1

POMABAMBA.

Silver	Genónimo Cisneros	1
"	José Estrada y C ^a	2

CAJATAMBO.

Silver	José D. Bahamonde y Ca	1
"	Pedro Prario.....	2
"	Julio Cámara	1
"	Andrés A. Alvarez	4
"	José del C. Reyes	10
"	José D. Bahamonde	1
"	Manuel T. Gonzalez	2
"	M. T. Gonzalez, S. P. Dunstan y T. F. Reyes	1
"	Manuel Ipince	2
"	Felix Octavio Cámara.....	1
"	Simon P. Dunstan y C ^a	3
"	A. Osterloch y A. Schultz	8
"	Felipe B. Mayta é hijos	2
"	Cárlas A. Haag	2
"	Mariano Lizarribar, Cárlas Mognaochi, Luis y P. Peraldo.....	6
"	Guillermo Renwinck	1
"	Isidro Espejo y M. Sosa y Arévalo	1
"	Isidro Espejo	1
"	Manuel I. Romero	3
"	Manuel y Emilio Ghidoli	3
"	Dámaso Fuentes Rivera	3
Coal.....	Pedro Prario.....	1

CAJAMARCA.

Mine.	Proprietor.	Number of holdings.
Silver	Alberto Martini	5
"	Socd. Minera de Chilete.....	20
"	Mercedes Bardales	1
"	J. Mariano Cacho	1
"	Francisco M. Santolaya	1
"	Ulises Batistini.....	1
Coal.....	Rafael Villanueva	1
"	Manuel Romero	1
Silver and lead ...	Soed. Minera de Chilete.....	8
Silver and copper	Carolina V. de Puga	3
Gold	Manuel Valero de Lopez	1

HUAUIAS.

Silver	J. M. Torrance, for the Compañía Patara	17
"	Julian Durán de la Torre	1
"	Dionisio Huici	2
"	Benjamin Olivera.....	4
"	José Chanca	1
"	Juan M. Figueroa y Cándido Vilas	2
"	Ricardo Rey y Basadre	6
"	M. Guerrero, D. Pardo & others	1
"	Plácido L. Angeles y HH	1
"	Vicente Zzeza y P. Renaud	1
"	Pablo Valle Leon.....	1
"	Empr. Minera de Uchcu	6
"	J. y B. Velez y Escudero	2
"	Brayson y Hermanos	2
"	Francisco Andabaka	2
"	Federico Alegre	1
"	José Laguna	4
"	Antonio Lucar	1
"	Francisco de Usua	1
"	Juan B. y Roberto Brayson	14
"	Santiago Bernardini y C ^a	2
"	Juan M. Figueroa	5
"	José Lagunas	6
"	Eduardo Chueca	2
"	Conrado Bassalik y Manuel Torres	1
"	Enrique Mendez & others	1
"	María Jesus Durán	2
"	Enrique Philipp	1
"	Juan H. Torrance	1
"	Manuel J. Beteta	1

HUAYLAS—*continued.*

Mine.	Proprietor.	Number of holdings.
Silver	Mariano M. Villafranca	2
"	Bartolomé Visbal.....	1
"	Enrique Almandas y socios	1
"	Cárlos Piérola	1
"	José R. Terry	1
"	José A. Lopez y José A. Romero	1
"	Javier Ramirez é hijos, Buenaventura y Lesco Ramirez	1
"	Eduardo y Ricardo Mendez	1
"	Carmelo Botello Mendoza & others	1
"	Eduardo Chueca	1
"	José Laguna y C ^a	1
"	Mariano Minaya y Villafranca	1
"	Juan B. Robles	1
"	Pedro Laguna	1
"	Simon A. Montañez.....	1
Coal	Juan M. Figueroa	1
"	Pablo Valle y Leon.....	1
"	M. M. Villafranca y E. F. Sanchez	1
"	Julian Durán la Torre	1
"	Benjamin Olivera	4
"	Gerónimo Cisneros	1
"	Juan B. y Roberto Brayson	1
Silver and lead ...	Conrado Bassalik y Manuel Torres	1
" " ...	Cárlos Piérola y Florentino Mendoza ...	1
" " ...	Luis Smith, for the Compañía Mineral de Uchcu	1
" " ...	Adolfo Arámbulo y Juan P. Castillo ...	1
" " ...	José E. Hidalgo, S. Giraldo y P. Cochachin.....	1
Copper	Cárlos A. Chueca	1
Coal.....	J. M. Torrance, for the Compañía Patara	1
Silver and Sulphur	José Rossasa	1

HUAYLLURA.

Gold	Aurelio García y García	6
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PALMADERAS.

Gold	Aurelio García y García	5
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ORCOPAMPA.

Silver	Oscar Heren	9
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RECUAY.

Mine.	Proprietor.	Number of holdings.
Silver	Wainwright, executors of	2
"	Custodio Bohorques	1
"	Antenor Pozo	2
"	Cáceres Hermanos	1
"	Manuel y Vicente Cáceres y A. Clark ...	2
"	Juana Lugo de Icaza	1
"	José Laguna	1
"	Juan M. Remy y C ^a	1
"	Socd. Sokoloski y Thierry.....	31
"	Juan M. Loli, A. A. Antunez, J. M. Morales, H. Gomez, y A. Larrañaga.	1
"	Oscar Peterson.....	2
"	M. Alzamora, A. Icaza, Manuel S. Morales y Juan Loli	2
"	Bartolomé y Lorenzo Torres	4
"	Cayetano Diaz.....	1
"	Luis Smith y Pedro C. Infante	1
"	José Patrocinio y M. E. Sanchez	1
"	Sokoloski y Thierry	4
"	Manuel J. Morales y socios	5
"	José Laguna, C. Figueroa y M. S. Alegre	2
"	José Laguna y Manuel Lazarte	1
"	Empresa Minera de Uchcu	2
"	Manuel Palma	1
Silver and copper.	Juan M. Remy y C ^a	1
"	Socd. Sokoloski y Thierry	2
Coal.....	Sokoloski y Thierry y D. Cáceres.....	1
"	Aloys Schreiber y Cayetano Diaz	1
"	Eugenio y E. Tarazona	1
"	Pedro G. Mejia.....	1
"	Miguel Ibeta, executors of	2
"	Pedro Cafferata.....	1

ACARI.

Copper	J. L. Tondicke y Vicuña	54
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HUANCAVELICA.

Silver	Cárlos M. Pflucker y HH.	29
"	Juan Iramátegui	3
"	Manuel Picasso y HH	3
"	Martin Fitz, Mauri y Angeles Lenci ...	4

HUALLANCA.

Mine.	Proprietor.	Number of holdings.
Silver	José Y. Durán	5
"	J. I. Durán y Elisa Theobal de Durán...	1
"	" y Pedro Pazos	1
"	Maria Bustamante	2
"	Andrea Huaynate	1
"	José Ignacio Durán é hijos	1
"	Elisa Theobal de Durán	3
"	José Bermudez	1
"	Pedro Rubin	1
"	Gregorio A. Durán	3
"	José Piqué Torres & others	2

CERRO DE PASCO.

Silver	José Gregorio Trelles	1
"	Juan Languasco	3
"	Juan Patricio	1
"	Pio Canta & others	3
"	Juan Palacios	2
"	Pedro Pablo Santa Maria	5
"	Manuel Clote y J. R. Azcárate	4
"	Hijos del Coronel Juan J. Salcedo	4
"	Benito Antonio Ijurra	6
"	Manuel Mier y Terán	1
"	José Malpartida	16
"	M. A. de La Torre	2
"	Bruno F. Morales	1
"	Maria Moreno	1
"	Benito Ijurra	1
"	Manuel Loayza y J. M. Maurtua	1
"	C. Izola, M. Dumacith y D. Mazzini	1
"	Lagravere é hijos y Maria Moreno	1
"	Gregorio A. Durán	2
"	José Aveleyra	4
"	Eduardo O. de Villate & others	1
"	Templeman Bergman y C ^a	3
"	José Gallo	1
"	Compañía La Esperanza	1
"	M. Loayza, J. Canessa y P. Venegas	1
"	Manuel Loayza y M. Lavado	2
"	Leandro del Campo	2
"	Manuel Ex-Hélmès	1
"	Andrés Lodoverasa	1

CERRO DE PASCO—*continued.*

Mine.	Proprietor.	Number of holdings.
Silver	Toribio A. Vial y J. M. Maurtua	1
"	Presentacion Benavides	1
"	Juan Costa	2
"	M. de la Sierra y Andrea Cabidia.....	1
"	E. O. de Villate, executors of	11
"	Pedro Narvaez	1
"	Lagrave é hijos	32
"	Eulalia Santivañez	1
"	Juan de Ugarte	2
"	Melchora Vaquero	1
"	Francisco Sagastabeytia	1
"	Francisco Sagastabeytia, E. Gomez Hurtado y M. S. Jurado.....	5
"	Agustin Tello	9
"	Guillermo Cheneman y R. Adams	2
"	C. Minaya, A. Languasco y A. Maghella	4
"	Julian Minaya	1
"	Manuel Chavez.....	19
"	José M. Ecurra y Erasmo Fernandini...	3
"	José M. Maurtua	1
"	Jorge E. Steel	11
"	Juan A. Gordillo	1
"	Severino Lobaton y C ^a	3
"	Ignacio Alvarez	1
"	Pedro Rossi	1
"	Juan Mayta	1
"	Juan Esparza	1
"	Josefa Navarro.....	6
"	Ignacio Rey por la casa Steel	5
"	Jorge E. Steel por M. Gutierrez	4
"	Rosa Mercedes Amalia y F. Riglos	6
"	Herederos de José Aveleyra	5
"	Manuel Dámaso Tello.....	1
"	Juan Languasco y C ^a	4
"	Escolástica Falcon	3
"	Ditto (in litigation with D. L. Contreras)	2
"	Apolinario Franco	5
"	Eduviges Campo Redondo de Matute ...	7
"	Manuel I. de La-Torre	10
"	Antonio Cárdenas	1
"	Carmen Cárdenas de Máurtua	1
"	Pedro Caballero y Valbertini y C ^a	1
"	Isabel Alvarado	1
"	Cirilo Bazo	1

CERRO DE PASCO—*continued.*

Mine.	Proprietor.	Number of holdings.
Silver	Mercedes Bony.....	5
"	Ditto (in litigation with Buenaventura del Castillo)	5
"	Ditto (in litigation with la Sociedad Colquijirca)	1
"	Genara Maghella.....	19
"	Juan Esparza	1
"	José María Maurtua	2
"	Federico Verástegui	1
"	F. Herrera y M. Tapia	5
"	Felix y R. Otero	5
"	Manuel Sanchez Cossio	2
"	Pio Canta	4
"	Juan é Isidro Rodriguez y J. Barrera ...	4
"	Manuel Loayza	1
"	Tiburcio Matos	1
"	Justo R. Ascárate y C ^a	1
"	Casimiro Noria	2
"	Pascual Ortiz	3
"	María Moreno V. de Puch (in litigation with Dr. D. M. Maiz).....	8

MINAS DE PLATA PROVISIONALES.

Silver	P. Steel	2
"	G. Negrete, por M. Guzman	1
"	Ceverino Lovaton	1
"	J. Duran	1
"	Ramador y J. H. Rivas	1
"	Bernardo Eño	1
"	Andrés Trujillo	2
"	J. J. Valdivieso	2
"	Justo R. Ascarate	1
"	Manuel Moreno y Mais	12
"	Pedro Narvaez	1
"	Manuel Pardo	1
"	L. C. Contreras J. Teresa de Faño	2
"	D. A. Gordillo	2
"	Cárlos Minaya	3
"	Benito A. Ijurra	4
"	Manuel S. de La-Torre	1
"	Andrés Trujillo, L. A. Flores y C. Merino ..	1
"	Andrés Pajares	1
"	Manuel A. de La-Torre	3
"	A. H. de Ortiz y M. Nano.....	2
"	Luis Márques	3

CERRO DE PASCO—*continued.*

Mine.	Proprietor.	Number of holdings.
Silver	Juan é Isidro Rodriguez	1
"	Juan Languasco	1
"	J. R. Azcárate y J. M. Escurra	4
"	Sociedad Internacional	10
"	Casimiro Noria	1
"	Francisco Martinenchi	1
"	Sociedad Colquijirca	8
"	A. Gonzalez	1
"	C. Minaya	1
"	Pedro Narvaez y Benito A. Ijurra	1
"	Erasmo Forzano	1
"	Victoriano Rivera	1
"	Jesús Gutierrez	1
"	Manuel N. Valdizan	1
"	Gallo por	1
"	Wenceslao Jimeno	1
"	Leon Becerra	1
"	Clodomiro Cárdenas	1
"	Manuel Mier y Teran	1
"	Juan Rodriguez	1
"	Agusto Lequerica	1
"	Asuncion H. de Ortiz y Manuela Nano	1
Coal	P. Roman y L. de La Puente	2
"	José Rufino Cárdenas	2
"	Casimiro Minaya	1
"	Jaime Garreta y Toribio Diaz	2
"	Compañía La Esperanza	4
"	Claudio Gutierrez	3
"	Guillermo Myers	3
"	Felipa Tello de Sanchez	1
"	J. y Purificación Sanchez & others	3
"	Juan A. Gordillo	5
"	Toribia Diaz	1
"	Ricardo Myers	1
"	Federico Verástegui	1
"	Manuel Benavides y María Lugo	3
"	Manuel Benavides	1
"	J. Steel y C ^a provl	1
"	Sociedad Internacional provl	3
"	Ignacio Alama provl	2
Not stated	Carolina Pellegrin y F. Alania	1
"	Vicente Cabiedes	1
"	Manuel Arrieta	1
Silver and lead ...	Clodomiro Cárdenas y Manuel D. Ortiz	2

YAULI.

Mine.	Proprietor.	Number of holdings.
Silver	Pfucker Hermanos	17
"	Compañía de Minas del Carmen	9
"	Montero Hermanos	27
"	Francisco Mendizábal y C ^a	1
"	José Maria de La-Torre	4
"	Federico Fernandini	1
"	J. M. Mendizabal y R. Cruz	2
"	Mariano Mendizabal y HH.	1
"	Compañía San Luis	1
"	Cárlos M. Pfucker HH.	9
"	José Sebastian Argumedo	1
"	T. Conroy y T. A. Gorré	1
"	F. Piana y L Nigra	4
"	Ricardo M. Mahr	3
"	J. Schultz y C ^a	1
"	Emiliano Llona y C ^a	4
"	Francisco Mendizabal	4
"	R. Mahr y J. Urizar	3
"	P. Sieveking, F. La Torre Bueno & others	4
"	Tomás Conroy	3
"	Cármén K. de Mendizabal	2
"	Aurelio Bravo	1
"	Francisco B. Mendizabal	1
"	Enrique J. Garland	4
"	F. de La-Torre, B. J. Sieveking & others	3
"	Enrique Stuber	3
"	José Bannoni	2
"	Julio Dieckchiff	1
"	Edmundo Solff	1
"	J. Galvez, Tomás Barnar y Jorge Paqué	3
"	Pedro Félix Remy	1
"	Alvino Carranza y Alejandro Haza	2
"	Emiliano Llona	1
"	Emiliano Llona y C ^a	4
"	Marcelino Botoni y Cárlos Duterán	1
"	Calixto Landa y T. Gorje	1
"	F. J. Alvarez y J. Zacharias	1
"	Demetrio F. Bravo	1
"	Felipe Guerra	3
"	Teófilo Goré y Pedro Villanueva	1
"	Lizandro Montes	4

YAUJI—continued.

Mine.	Proprietor.	Number of holdings.
Silver	Blas Buscoviche y H.	2
Pyrites.....	Pflucker Hermanos	1
Cinnabar.....	Montero Hermanos	1
Coal.....	Cárlos M. Pflucker H.H.	5
"	Francisco B. Mendizabal	1
"	Blas Buscoviche y H.	1
Silver and copper	Francisco Alvarez	1

HUARACHIRI.

Silver	Sociedad de los Andes	7
"	Compañía de Minas Americana	8
"	Leonidas Aveleira	10
"	Demetrio Olavegoya	1
"	Compañía Casapalca	7
"	José Pereyra	3
"	Amalia G. de Solís	3
"	D. Olavegoya, executors of	1
"	Enrique J. Garland	3
"	Geraldo Garland	4
"	Pablo G. Solís	1
"	A. Garland y C ^a	7
"	Enrique Juan Garland	2
"	Juan Harris y J. P. Sewell.....	3
"	Juan Harris	2
"	Compañía de Minas del Cármen	5
"	Aveleira y C ^a	2
Silver, lead and sulphur	Alejandro Delboy y C ^a	4

JAUJA.

Silver.....	Bernardo Pruss	1
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YAUYOS.

Silver.....	Matias Flores	9
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ICA.

Copper	A. Garland y C ^a	8
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CHANCAY.

Silver	Jacinto Arrieta	2
"	Luis Peraldo & others	3
Silver and lead ...	Federico Verástegui y Manuela Bao ...	2, 3

AREQUIPA.

Copper and silver	Cárlos Wagner y C ^a	1
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PUNO.

Mine.	Proprietor.	Number of holdings.
Silver	Cárlos Wagner y C ^a	2
"	Adolfo Guinacci, Francisco Bonati y Gerónimo Costa	1
"	Juan Martín Echenique	1
"	Adrian Moens	1
"	Mariano Bustamente y Barreda	7
Quicksilver	Gerónimo Costa	3
Gold	Justa R. Valdez, Luis Dahnsen y Jorge Yóskuhl	1
"	José María Peña	2

CASTRO VIREYNA.

Not indicated ...	C. M. Pflucker y HH	2
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CAYLLOMA.

Gold and silver...	Mateo Corona y C ^a	7
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LAMPA.

Silver	Mariano y Lorenzo y Carrion	2
"	Manuel Jaen y Marcelino Salas.....	1
"	Feliciano Rivas	1
Copper	Agustín Pastor y Feliciano M. Rivas ...	1
Not stated	Agustín Pastor y Federico Luna	1

SUMMARY.

Silver Mines	1,171
Coal	70
Copper	66
Petroleum	29
Gold and Silver	25
Silver and Lead	23
Silver and Copper	20
Gold	16
Not specified	13
Sulphur	12
Silver and Zinc.....	4
Cinnabar	4
Pyrites	1
Silver and Quicksilver.....	1
Gold Washing	1

 1,456

The Register also contains the official number of the mine, the name, dimensions, and the locality in which it is situated.

CHAPTER XI.

Political Organisation.—Departments and Provinces.—Education, &c.

THE Peruvian Republic proclaimed its independence on the 28th of July, 1821. The executive power is exercised by the President of the Republic, whose term of office lasts four years. The executive functions are shared with the President and Vice-President by five Ministers of State, who are responsible for the acts they countersign. The constitution of the State is divided into three independent bodies,—the executive power, the legislative power (a Senate of 50 and a Chamber of 110 members), and the judicial power. Each province, as also the capital, Lima, elects its deputies by the indirect vote of the people, who nominate the electors, and these the President of the Republic, the senators, and the deputies.

The Republic is divided into nineteen Departments, which are governed by a prefect; and the departments into provinces, which are each governed by a sub-prefect. The President elects the prefects and sub-prefects. All questions of disputed claims against the Government are settled by the Supreme Court of Justice. The provincial constitutions are bound to insure to each province its administration of justice, its municipal system, and primary education. The local government, or municipal corporation, established in each town, is called *Juntas Municipales*. The members are elected from amongst the most influential inhabitants, who conduct all matters relating to local affairs. The chief magistrate, or mayor, is called the *Alcalde Municipal*, and the other members of the corporation are the *Teniente Alcalde*, *Syndic* (judge), two *Jueces de Paz* (justices of the peace), and three *Regidores* (aldermen). Serious charges are tried by the *Juez Derecho*, or judge of the province, and the capital of each Department has a supreme court, where cases of importance are dealt with, the highest tribunal being the Supreme Court at Lima.

MALE POPULATION OF PERU, ACCORDING TO THE
OFFICIAL CENSUS OF 1876.

*Obliged to pay the Personal Tax according to the law of
November 14, 1886.¹*

DEPARTMENT OF ANCACHS.

HUARI.		CAJATAMBO.	
Chacas	5,826	Acas	422
HUARI	4,503	Ambar	404
San Luis	3,797	Andajes	306
Llamellin	3,638	Aquia	642
Huachis	3,256	Caujul	477
Uco	2,436	Cochas	262
Huantar	1,747	Cochamarca	356
San Marcos	1,608	Cajacay	812
Chavin	1,547	CAJATAMBO	1,251
	<hr/>	Chiquiam	1,021
	28,358	Gorgor	956
	<hr/>	Huasta	796
HUARAZ.		Huancapon	465
Aija	2,518	Huayllacayan	709
Carhuaz	8,258	Mangas	783
Cotaparaco	1,105	Ocros	1,097
HUARAZ	6,891	Oyon	1,290
Yangas	1,401	Pacilon	525
Marca	925	Pachangará	588
Pampas	1,650	Ticlos	1,142
Pararin	820		<hr/>
Pariacoto	741		14,304
Recuay	2,275		<hr/>
Yungar	1,033		
	<hr/>		
	27,617		
	<hr/>		
HUAYLAS.		PALLASCA.	
Ancachs	7,491	Cabana	1,670
CARAZ	4,225	CORONGO	2,791
Huata	748	Llapo	1,153
Huaylas	2,630	Pallasca	3,261
Macate	1,712	Tauca	1,334
Mato	953		<hr/>
Mancos	1,381		10,209
Pamparomas	1,551		<hr/>
Pueblo Libre	1,842		
Shupluy	924		
Quillo	812		
	<hr/>		
	24,269		
	<hr/>		
		POMABAMBA.	
		Parobamba	3,586
		Piscobamba	7,339
		POMABAMBA	4,550
		Sihuas	4,195
			<hr/>
			19,670
			<hr/>

¹ This law established a tax to be paid by all males above twenty-one years and under sixty years, of one sole, paid half-yearly by those living in the Sierra, and two soles by those living on the Coast.

MALE POPULATION OF PERU.

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DEPARTMENT OF ANCACHS—continued.

SANTA.		SUMMARY.	
CASMA	4,189	Huari	28,358
Huarmey	651	Huaraz	27,617
Moro	1,698	Huaylas	24,269
Nepeña	3,652	Cajatambo	14,304
Santa	2,157	Pallasca	10,209
Yautan	424	Pomabamba	19,670
	<u>12,771</u>	Santa	12,771
			<u>137,198</u>

DEPARTMENT OF AMAZON.

BONGARÁ.		LUYA.	
Copallin	311	Bagua	248
Jumbilla	375	Colcabamba	282
Peca	101	Colcamar	526
SAN CARLOS	348	Conila	401
Shipasbamba	300	Jamalca	279
Yambrasbamba	179	LAMUD	831
	<u>1,614</u>	Lonya Chico	537
		Lonya grande	471
		Laja	637
		Ocalli	310
		Ocumal	409
		Pisuqui	295
		San Gerónimo	401
		Santo Tomás	596
		Tingo	366
		Yamon	149
			<u>6,738</u>
CHACHAPOYAS.		SUMMARY.	
Balsas	188	Bongará	1,614
CHACHAPOYAS	1,863	Chachapoyas	7,962
Chiliquin	288	Luya	6,738
Chuquibamba	168		<u>16,314</u>
Huancas	314		
Jalca	565		
Levanto	188		
Leymebamba	429		
Molinopampa	328		
Olleros	426		
Omia	249		
Quinjalca	533		
Santa Rosa	161		
San Nicolas	832		
Soloco	445		
Soquia	557		
Totora	428		
	<u>7,962</u>		

DEPARTMENT OF APURIMAC.

ABANCAY.		AYMARAES.	
ABANCAY	2,417	Colcabamba	1,844
Circa	945	CHALHUANCA	2,532
Curahuasi	2,404	Chapimarca	1,004
Lambrama	1,165	Sorayo	1,842
Pichishua	1,272	Tapayrihua	1,739
	<u>8,203</u>		<u>8,961</u>
ANDAHUAYLAS.		COTABAMBAS.	
ANDAHUAYLAS	2,187	Cotabambas	2,081
Chincheros	3,573	Chuquibambilla	2,443
Huancarama	2,870	Haquira	1,453
Huancaray	3,057	Huayllati	1,882
Occobamba	1,966	Mamara	1,944
Ongoy	1,483	Mara	2,461
Pampachiri	2,217	TAMBOBAMBA	2,407
San Gerónimo	4,207		<u>14,671</u>
Talavera	2,175		
	<u>23,735</u>		
ANTABAMBA.		SUMMARY.	
ANTABAMBA	1,508	Abancay	8,203
Oropesa	593	Andahuaylas	23,735
Pachaconas	445	Antabamba	3,406
Sabayno	860	Aymaraes	8,961
	<u>3,406</u>	Cotabambas	14,671
			<u>58,976</u>

DEPARTMENT OF AREQUIPA.

CASTILLA.		LA UNION.	
Andagua	513	Alca	3,040
APLAO	968	COTAHUASI	1,436
Chachas	855	Charcana	510
Choco	515	Huaynacotas	1,082
Huancarqui	1,768	Pampamarca	668
Orcopampa	600	Quechualla	417
Pampacolca	3,345	Sayla	665
Uracá	775	Tomepampa	461
Viraco	3,275	Toro	742
	<u>12,614</u>		<u>9,021</u>

MALE POPULATION OF PERU.

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DEPARTMENT OF AREQUIPA—*continued*.

AREQUIPA.		CAYLLOMA.	
AREQUIPA	12,733	Achoma	320
Cayma	1,589	Cabanaconde	1,116
Characato	852	Callalli	535
Chiguata	776	CAYLLOMA	1,157
Paucarpata	1,480	Coporaque	290
Pocci	724	Chivay	597
Quequeña	1,074	Ichupampa	208
Sabandia	524	Lari	332
Sachaca	1,329	Lluta	442
Socabaya	1,327	Maca	243
Tiabaya	1,465	Madrigal	228
Uchumayo	531	Sihuas	651
Vitor	803	Tapay	687
Yanahuara	2,010	Tisco	707
Yura	462	Tuti	522
	<u>27,679</u>	Yanque	783
			<u>8,818</u>
CAMANA.		CONDESUYOS.	
Acari	1,197	Andaray	623
Atiquipa	118	Cayaracu	373
CAMANA	2,883	CHUQUIBAMBA	2,527
Carabelí	1,883	Salamanca	963
Chala	207	Yanaquihua	738
Chaparra	361		<u>5,224</u>
Huanuhuanu	141		
Jaqui	376		
Ocoña	685		
Quicacha	423		
Sihuas	284		
Yauca	158		
	<u>8,716</u>		
ISLAY.		SUMMARY.	
ISLAY	1,046	Arequipa	27,679
Quilca	331	Camana	8,716
Tambo	3,598	Castilla	12,614
	<u>4,975</u>	Condesuyos	5,224
		Caylloma	8,818
		Islay	4,975
		La Union	9,021
			<u>77,047</u>

DEPARTMENT OF AYACUCHO.

CANGALLO.		LUCANAS.	
Canaria	1,101	Aucará	947
CANGALLO	1,565	Cabana	1,062
Carapo	576	Charhuanca	382
Colca	622	Chipao	843
Chuschi	1,260	Huacaña	488
Hualla	1,925	Laramate	1,542
Huambalpa	—	Otoca	703
Huancuraylla	557	Pacyo	540
Paras	764	PUQUIO	1,572
Sancos	914	Querobamba	931
Totos	769	Sancos	540
Vischongo	558	San Juan	939
	<u>10,611</u>	Santa Lucia	382
		Soras	430
			<u>11,301</u>
HUAMANGA.		PARINACOCHAS.	
Acos Vinchos	1,668	Colta	822
AYACUCHO	4,618	CORACORA	2,023
Chiara	918	Corculla	774
Quinua	1,739	Chumpi	872
Santiago	1,821	Lampa	1,785
Socos Vinchos	2,342	Oyolo	1,035
Tambillo	2,035	Pacapausa	1,641
	<u>15,141</u>	Pararca	749
		Pausa	1,197
		Pullo	1,094
			<u>11,992</u>
HUANTA.		SUMMARY.	
Huamanguilla	2,442	Cangallo	10,611
HUANTA	3,048	Huamanga	15,141
Luricocha	1,927	Huanta	7,417
	<u>7,417</u>	Lucanas	11,301
		Parinacochas	11,992
		La Mar	12,510
			<u>68,972</u>
LA MAR.			
Auco	2,377		
Chungui	2,253		
San Miguel	4,562		
Tambo	3,318		
	<u>12,510</u>		

DEPARTMENT OF CAJAMARCA.

CAJABAMBA.		CHOTA.	
Cachachi	1,517	Cachen	1,181
CAJABAMBA	1,827	Cochabamba	1,333
Cauvay	603	Cutervo	3,182
Colcabamba	713	Chata	6,463
Huceyllabamba	648	Huambos	1,522
Pampa	829	Lajas	1,926
Nuñunabamba	519	Llama	1,384
Purihual	435	Paccha	836
Sayapullo	751	Pion	366
Sitacocha	1,292	Querocoto	1,032
	<hr/>	Sócota	1,003
	9,134	Tacabamba	3,898
	<hr/>		<hr/>
			24,126
CAJAMARCA.		HUALGAYOC.	
Asuncion	2,016	Bambamarca	3,947
CAJAMARCA	6,937	Hualgayoc	4,285
Cospan	1,644	Llapa	2,203
Chetilla	690	Niepos	1,457
Encañada	1,391	San Gregorio	1,084
Ichocan	2,238	Santa Cruz	3,429
Jesus	2,498	San Miguel	5,143
Llacanova	619		<hr/>
Magdalena	449		21,548
Matará	748		<hr/>
San Márcos	3,452		
San Pablo	3,746		
	<hr/>		
	26,425		
	<hr/>		
CELEDIN.		JAEN.	
CELEDIN	1,943	Bellavista	281
Chumuch	866	Callayuc	535
Huashmin	580	Colasay	1,096
Huaucó	808	Cujillo	435
Lucmapampa	684	JAEN	569
Sorochuco	1,308	Choros	123
	<hr/>	Jaen	509
	6,279	Pimpingos	494
	<hr/>	Querocotillo	788
		Sallique	370
CONTUMAZÁ.		San Ignacio	675
Cascoas	1,760	San Felipe	386
Contumazá	2,577	Tabaconas	364
Guzmango	1,255		<hr/>
Trinidad	982		6,625
	<hr/>		<hr/>
	6,574		
	<hr/>		

DEPARTMENT OF CAJAMARCA—*continued*.

SUMMARY.		Brought forward	48,412
Cajabamba	9,134	Chota	24,126
Cajamarca	26,425	Hualgayoc	21,548
Celedin	6,279	Jaen	6,625
Contumazá	6,574		
			<u>100,711</u>
Carried forward	48,412		

PROVINCE OF CALLAO.

Callao, including Bellavista	<u>20,218</u>
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DEPARTMENT OF CUZCO.

AUTA.		CANCHIS.		
AUTA	3,918	Cacha	2,446	
Limatambo	3,122	Checcacupe	2,851	
Zurite	3,561	Marangani	2,143	
	<u>10,601</u>	Pampamarca	1,166	
		SICUANI	6,437	
		Tinta	2,908	
			<u>17,951</u>	
ACOMAYO.		CUZCO.		
ACOMAYO	3,153	CITY OF CUZCO. {	Belen	536
Pomacanchi	2,522		Matriz	3,820
Rondocan	1,391		San Blas	803
Sangarará	1,732		S. Cristobal	537
	<u>8,798</u>		Santa Ana	395
			Santiago	611
			S. Jeronimo	1,296
			San Pedro	1,389
CALCA.			San Sebastian	1,098
CALCA	3,367			<u>10,485</u>
Lares	1,475	CHUMBIVILCAS.		
Pisac	2,256	Capacmarca	594	
	<u>7,098</u>	Colquemarca	3,207	
		Chamaca	874	
CANAS.		Livitaca .....	...
Coporaque	4,233	Sto. Tomas and Llusco.	3,550	
Checca	1,918	Velille	782	
Langui	1,613		<u>9,007</u>	
Layo	1,112			
Ocoruro	478			
Pichihua	1,570			
YANAoca	1,841			
Yauri	4,451			
	<u>17,216</u>			

MALE POPULATION OF PERU.

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DEPARTMENT OF CUZCO—continued.

PAUCARTAMBO.		URUBAMBA.	
Caycay	1,609	Maras	3,083
Colquepata	1,059	Ollantay-tambo	1,308
Ccatcca	1,483	URUBAMBA	3,467
Challabamba	1,100		<u>7,858</u>
PAUCARTAMBO	1,871		
	<u>7,122</u>		
QUISPICANCHI.		CONVENCION.	
Marcapata	1,028	Echarati	1,329
Ocongate	1,354	Huayopata	926
Oropeza	2,260	Occobamba	794
Quiquijana	3,113	SANTA ANA	2,326
URCOS	2,484		<u>5,375</u>
	<u>10,239</u>		
PARURO.		SUMMARY.	
Accha	1,688	Acomayo	8,798
Collcha	894	Auta	10,601
Ccapi	894	Calca	7,098
Huanoquite	1,270	Canas	17,216
Omacha	1,259	Canchis	17,951
PARURO	2,459	Convencion	5,375
	<u>8,464</u>	Cuzco	10,485
		Chumbivilcas	9,007
		Paruro	8,464
		Paucartambo	7,122
		Quispicanchi	10,239
		Urubamba	7,858
			<u>120,214</u>

DEPARTMENT OF HUANCAVELICA.

CASTROVIREYNA.		TAYACAJA.	
Arma	899	Auco	1,315
CASTROVIREYNA	679	Colcabamba	2,227
Cordova	1,775	Huaribamba	1,861
Chavin	768	Locroja	1,664
Huachos	626	Mayoc	1,885
Huangascar	691	PAMPAS	3,806
Huaytará	474	Paucarbamba	2,470
Pilpichaca	824	Salcabamba	2,450
Chocarvo	1,229	Surcubamba	1,464
	<u>7,965</u>		<u>19,142</u>

DEPARTMENT OF HUANCAMELICA—*continued*.

ANGARAES.		HUANCAMELICA.	
ACOBAMBA	3,804	Acoria	4,437
Caja	2,316	Conayca	1,221
Julcamarca	3,597	HUANCAMELICA	3,970
Lircay	3,244	Moya	2,174
	<u>12,961</u>		<u>11,802</u>

SUMMARY.

Angaraes	12,961
Castrovireyna	7,965
Huancavelica	11,802
Tayacaja	19,142
	<u>51,870</u>

DEPARTMENT OF HUANUCO.

DOS DE MAYO.		HUAMALIES.	
AGUAMIRO	1,280	Arancay	687
Baños	1,127	Huacaybamba	1,362
Chavin	1,746	Huacrachuco	2,312
Chupan	1,633	Llata	2,246
Huallanca	849	Monzon	783
Jesus	1,298	Pinza	1,984
Obas	1,667	Singa	1,412
Pachas	1,701		<u>10,786</u>
	<u>11,301</u>		
HUANUCO.		SUMMARY.	
Chinchas	1,354	Dos de Mayo	11,301
Higueras	1,918	Huamalties	10,786
Huacar	2,821	Huánuco	17,195
HUANUCO	5,134		<u>39,282</u>
Panas	2,413		
Pozuzo	248		
Santa Maria del Valle .	3,307		
	<u>17,195</u>		

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DEPARTMENT OF ICA.

ICA.		CHINCHA.	
ICA	4,916	Chincha Alta	8,259
Nazca	1,716	Chincha Baja	4,690
Palpa.....	1,901	Humay	1,010
Pueblo Nuevo	2,244	PISCO.....	4,217
S. Juan Bautista	3,734	Tambo Mora	416
Santiago	1,473		
Yauca	610		
	<hr/>		<hr/>
	16,594		18,592
	<hr/>		<hr/>
		SUMMARY.	
		Chincha	18,592
		Ica	16,594
			<hr/>
			35,186

DEPARTMENT OF JUNIN.

<p>JAUJA.</p> <p>Apata 3,854</p> <p>Cincos 1,782</p> <p>Comas 2,604</p> <p>Concepcion 2,526</p> <p>Huaripampa 2,703</p> <p>JAUJA 10,341</p> <p>Mito 2,368</p> <p>Orcotuna 2,440</p> <p>28,618</p>		<p>Brought forward 14,832</p> <p>Pariahanca 2,632</p> <p>San Gerónimo 2,940</p> <p>San Juan 1,691</p> <p>Sicaya 1,450</p> <p>Zapallanga 4,950</p> <p>28,495</p>
<p>PASCO.</p> <p>Cariva 4,356</p> <p>CERRO 4,775</p> <p>Chacayan 2,709</p> <p>Huancabamba 428</p> <p>Huariaca 4,327</p> <p>Huayllay 491</p> <p>Ninacaca 1,282</p> <p>Yanahuanca 3,912</p> <p>22,280</p>		<p>TARMA.</p> <p>Acobamba 4,878</p> <p>Carhuamayo 2,296</p> <p>Chanchamayo 1,071</p> <p>Junin 3,872</p> <p>Marcapomacocha 630</p> <p>TARMA 6,667</p> <p>Vitor 618</p> <p>Yauli 2,572</p> <p>22,604</p>
<p>HUANCAYO.</p> <p>Colca 2,556</p> <p>Chongos 1,645</p> <p>Chupaca 5,729</p> <p>HUANCAYO 4,902</p>		<p>SUMMARY.</p> <p>Huancayo 28,495</p> <p>Jauja 28,618</p> <p>Pasco 22,280</p> <p>Tarma 22,604</p>
<p>Carried forward 14,832</p>		<p>101,997</p>

DEPARTMENT OF LAMBAYEQUE.

LAMBAYEQUE.		CHICLAYO.	
Ferriñafe	4,041	Chiclayo	6,775
Jayanca	1,597	Chongoyape	990
LAMBAYEQUE	4,315	Eten	2,063
Mochumi	1,121	Lagunas	585
Morropo	2,435	Monsefú	4,341
Motupe	3,110	Picsi	2,004
Almos	2,075	Reque	780
Pacora	814	Saña	1,715
Salas	5,944		
San José	867		
			<u>19,253</u>
	<u>26,319</u>		
		SUMMARY.	
		Chiclayo	19,253
		Lambayeque.....	26,319
			<u>45,572</u>

DEPARTMENT OF LIBERTAD.

PATAZ.		OTUZCO.	
Bambamarca	753	Charat	877
Buldibuyo	1,177	Huaranchal	398
Cajamarquilla	687	La Cuesta	321
Chilia	1,853	Lucma	907
Huancaspata	2,239	Marmot	415
Huaylillas	504	OTUZCO.....	5,238
Guayo	459	Salpo	1,034
PARCOY.....	921	Sinsicap	1,245
Pataz	2,100	Usquil	3,939
Soledad	274		
Tayabamba	3,046		
Uchumarca	274		
			<u>14,374</u>
	<u>14,167</u>		
		TRUJILLO.	
		Ascope	3,657
		Chicama	1,452
		Chocope	1,904
		Huanchaco	350
		Mngdal. de Cao	562
		Moche	669
		Payjan	1,525
		Santiago de Cao	1,296
		Simbai	654
		TRUJILLO	5,585
		Virú	1,740
			<u>19,394</u>
PACASMAYO.			
Chepen	2,417		
Guadalupe	2,150		
Jequetepeque	463		
PACASMAYO	566		
Pueblo Nuevo	460		
San José	747		
San Pedro.....	2,541		
	<u>9,344</u>		

DEPARTMENT OF LIBERTAD—*continued.*

HUAMACHUCO.		SUMMARY.	
Huamachuco	7,301	Huamachuco	18,922
Marcabal	1,263	Otuzco	14,374
Mollepata	2,774	Pacasmayo	9,344
Stgo. de Chuco	5,882	Pataz	14,167
Sartirubamba	1,702	Trujillo	19,394
	<u>18,922</u>		<u>76,201</u>

DEPARTMENT OF LIMA.

CANTA.		CHANCAY.	
Araguay	659	Aucallama	1,559
Atavillos altos	673	Barranca	1,596
Atavillos bajos	814	Chancay	3,158
CANTA	1,340	Checras	1,154
Huamantanga	1,842	HUACHO	4,864
Lampian	804	Huaura	2,602
Pacaraos	664	Ihuari	759
S. Buenaventura	708	Paccho	1,203
	<u>7,504</u>	Pativilca	2,611
		Sayan	1,554
		Supe	1,704
			<u>22,764</u>
CAÑETE.		LIMA.	
CAÑETE	2,996	Ancon	379
Coayllo	630	Ate	2,107
Chilca	1,076	Barranco	553
Lunahuaná	2,960	Carabaylo	3,190
Mala	1,344	Chorrillos	2,373
Pacarán	743		
San Luis	3,093		
	<u>12,842</u>		
HUARACHIRI.		CIUDAD.	
Carampoma	524	{ Ctel. 2° 8,541 ... Id. 2° 14,479 ... Id. 3° 10,131 ... Id. 4° 10,503 ... Id. 5° 11,585 ...	} 52,239
Casta	552		
Chorrillos	861		
Huarochiri	809		
MATUCANA	1,086		
Olleros	314	Lurigancho	1,036
Quinti	837	Lurin	1,049
San Damian	644	Magdalena	1,089
San Mateo	832	Miraflores	682
Santa Eulalia	665	Pachacamac	756
	<u>7,124</u>	Surco	1,310
			<u>66,763</u>

DEPARTMENT OF LIMA—*continued*.

YAUYOS.		SUMMARY.	
Ayaviri	463	Canta	7,504
Chupamarca	809	Cañete	12,842
Huáñec	1,048	Chancay	22,764
Laraos	1,837	Huaro-chiri	7,124
Omas	320	Lima	66,763
Pampas	1,183	Yauyos	7,628
Tauripampa	497		
Vinac	361		
YAUYOS	1,110		124,625
	<u>7,628</u>		

DEPARTMENT OF LORETO.

ALTO AMAZONAS.		HUALLAGA.	
Andoas .....	.....	Catalina	232
BALZAPUERTO	603	Juanfui	466
Cahuapanas	732	Lamas	4,302
Jeveros	853	Pachiza	451
Lagunas	733	Saposa	1,992
Santa Cruz	470	Sarayacu	317
Yurimaguas	652	TARAPOTO	5,440
	<u>4,043</u>	Tingo Maria	763.
			<u>13,963</u>
BAJO AMAZONAS.		MOYOBAMBA.	
IQUITOS	1,565	Calzada	526
Loreto	786	Habana	614
Nauta	1,699	MOYOBAMBA	4,728
Parinari	578	Rioja	2,315
Pevas	584	Soritor	743
	<u>5,212</u>		<u>8,926</u>
SUMMARY.			
Alto Amazonas	4,043		
Bajo Amazonas	5,212		
Huallaga	13,963		
Moyobamba	8,926		
			<u>32,144</u>

PROVINCE OF MOQUEGUA.

Carumas	1,154
Yehuua	1,007
Ilo	494
MOQUEGUA	4,272
Onrate	1,733
Puquina	1,799
Torata	2,757
Ubinas	1,303
	<u>14,519</u>

DEPARTMENT OF PIURA.

AYABACA.		TUMBES.	
AYABACA	7,459	Corrales	1,078
Cumbicus	2,350	S. Juan de la Virgen. ...	568
Chalaco	2,531	Tarumilla	167
Frias	3,920	TUMBES	1,127
Suyo	1,151		<u>2,940</u>
	<u>17,411</u>		
HUANCABAMBA.		PIURA.	
HUANCABAMBA	5,073	Castilla	620
Huarmaca	2,636	Catacaos	9,187
Sondor	737	Chulucanas	2,711
	<u>8,446</u>	Morropón	2,301
		PIURA	2,962
		Salitral	613
		Sechura	4,534
		Tambo Grande	3,896
			<u>26,824</u>
PAYTA.		SUMMARY.	
Amotape	1,503	Ayabaca	17,411
Arenal	336	Huancabamba	8,446
Colan	986	Payta	10,168
Huaca	1,299	Piura	26,824
PAYTA	1,053	Tumbes	2,940
Querecotillo	1,697		<u>65,789</u>
Sullana	3,204		
	<u>10,168</u>		

DEPARTMENT OF PUNO.

AZANGARO.		CHUCUITO.	
Achaya	905	Desaguadero.....	448
Arapa	1,798	Huacullani	967
Asillo	3,093	Ylave	5,544
AZANGARO	4,846	Julir	2,913
Caminaca	1,004	Pisacoma	560
Chupa	1,679	Pamata	1,972
Munani	1,300	Santa Rosa	752
Potoni	702	Yunguyo	3,866
Pupuja	2,284	Zepita	4,097
Putina	1,803		
Saman	2,407		<u>21,119</u>
San Anton	802		
San José	973		
	<u>23,596</u>		
CARABAYA.		HUANCANÉ.	
Ajoyani	172	Cojata	1,189
Ayapata.....	1,096	Conima	1,616
Coasa	882	HUANCANÉ	4,670
Corani	478	Inchupalla.....	1,314
Crucero	590	Moho	3,729
Ytuata	797	Pusi	1,057
Macusani	720	Rosaspata	1,771
Ollachea	517	Taraco	2,063
Usicayos	409	Vilque chico.....	4,639
	<u>5,661</u>		<u>22,048</u>
PUNO.		LAMPA.	
Acora	4,142	Ayaviri	3,737
Atuncolla	1,031	Cabanilla	2,383
Cabana	1,926	Calapuja	338
Capachica	2,936	Cupi	376
Caracoto	2,451	LAMPA	3,202
Coata	775	Llalli	386
Chucuito	3,381	Macari	2,473
Juliacca	3,124	Nicasio	486
Paucarcolla	1,019	Nunco	1,188
Pichacani	969	Ocuviri	475
PUNO.....	3,574	Orurillo	2,535
San Antonio	341	Pucará	1,704
Tiquillaca	1,097	Santa Rosa	1,468
Vilquo	1,473	Umachiri	974
	<u>28,239</u>	Vilavila	303
			<u>22,028</u>

MALE POPULATION OF PERU.

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DEPARTMENT OF PUNO—continued.

SANDIA.		SUMMARY.	
Cuyo-Cuyo	1,145	Azangaro	23,596
Patambuco	801	Carabaya	5,661
Poto	412	Chucuito	21,119
Phora	945	Huancané	22,048
Quiaca	427	Lampa	22,028
SANDIA	2,560	Puno	28,239
Sirca	376	Sandia	6,666
	<u>6,666</u>		<u>129,357</u>

GENERAL SUMMARY OF DEPARTMENTS.

DEPARTMENTS.	Total Male Population.	Foreign Male Population.	Peruvians from 21 to 60 yrs.	Total liable to pay tax.
Amazonas	16,314	10	7,155	7,165
Ancachs.....	137,198	4,396	53,264	57,660
Apurimac	58,976	27	26,491	26,518
Arequipa	77,047	2,180	31,251	33,431
Ayacucho	68,972	66	32,070	32,136
Cajamarca	100,711	510	38,981	39,491
Callao	20,218	6,973	5,487	12,460
Cuzco	120,214	133	53,743	53,876
Huancavelica .	51,870	13	21,694	21,707
Huánuco	39,282	253	15,635	15,888
Ica	35,186	5,944	13,434	19,378
Junin	101,997	647	42,086	42,733
Lambayeque ...	45,572	4,226	17,180	21,406
La Libertad ...	76,201	9,547	28,639	38,186
Lima	124,625	32,222	40,352	72,574
Loreto	32,144	373	11,819	12,192
Moquegua	14,519	874	5,615	6,489
Piura	65,789	1,261	24,711	25,972
Puno	129,357	825	55,770	56,595
Tacna .....	.....	.....	.....	.....
Total Males ...	1,316,192	70,480	525,377	595,857
„ Females.	1,305,732			
Grand total ...	2,621,924			

EDUCATION.

Education has received great attention at the hands of the Government of late years in Peru. There are six universities,—at Lima, Cuzco, Arequipa, Truxillo, Puno, and Guamango. The State supports thirty-three colleges for men, and eighteen for women; 1,578 schools for boys, and 729 for girls. Lima itself has eight national colleges; one for the study of jurisprudence; an ecclesiastical seminary; a college for the study of medicine and other sciences; one for secondary instruction; a normal school; a naval and military institute; a college for obstetrics; a school of art and trades; an industrial municipal school; and the School of Civil Engineering and Mines. Altogether there are 112 establishments in Lima for educational purposes, thirty-nine for boys, sixty-eight for girls, and six mixed. The money voted by the State for educational purposes in 1877 amounted to 2,124,407 soles (£431,102) a year.

The School of Civil Engineering and Mines was founded in 1876, with a staff of eminent professors; this institution, which is the first of its kind in South America, is doing inestimable service in preparing the youths of Peru with a sound and practical knowledge of engineering and mineralogical science, which is indispensable for the pursuit of mining industry, and exceedingly necessary in a country like Peru, upon which its future so much depends. There are also in the capital the following public establishments:—a public library, museum, gallery of paintings, meteorological observatory, seventeen hospitals and asylums; seventeen societies, including benevolent and charitable institutions, gymnasium, &c.; seventeen clubs, including English, German, and Italian, English cricket, lawn tennis, &c.

Peru has produced many excellent sculptors and painters. Amongst the latter the name of Monteros stands pre-eminent. His celebrated painting, "The Funeral Obsequies of Atahualpa, the Last of the Incas," has been described as a grand masterpiece, and one of the most famous of modern paintings.

EMINENT MEN OF SCIENCE.

Peru has produced many eminent men in literature and science, amongst whom Señores Mariano Felipe Paz Soldan and Antonio Raimondi will be ever remembered in the country's history for their deep researches, and the valuable works they have contributed for their country's fame and benefit. The former is famous for his renowned travels and geographical surveys. He has left a most complete geographical work of the country—an atlas and a dictionary, the most perfect work ever published.

It is from Señor Paz Soldan's Atlas that the map which accompanies this work has been carefully compiled. Peru has only lately mourned the loss of her eminent citizen and devoted worker, Señor Paz Soldan, who died on the 31st December, 1886, aged sixty-five years, it is said of broken heart at his country's misfortunes. In the "Proceedings of the Royal Geographical Society," for June, 1887, Mr. Clements Markham, C.B., pays a just tribute to the memory of the late Señor Paz Soldan, who was an honorary member of the Society.

The name of Señor Antonio Raimondi is honoured throughout the whole scientific world for his valuable contributions to all branches of science. He is one of the most eminent men Peru has ever produced. His energies in promoting the interests of Peru have been ceaseless. He has travelled from one extremity of the country to the other, fearless of dangers,—amongst the savage tribes, studying their customs, and descending unknown rivers, collecting minute accounts of all the natural history, geography, geology, antiquities, botany, zoology, mineralogy, &c., of the country; and he has compiled several stupendous volumes relating to his studies. Thanks to Providence his valuable life is yet spared to Peru, and he is still actively engaged in completing his great work in order that the vast resources of the country may be properly known.

On many occasions these two eminent men have contributed papers of great interest to the Royal Geographical Society, London, and lately the worthy Chairman said in reference to these devoted scientists—"That so long as Peru has such men as Paz Soldan and Raimondi to guide her, she must progress."

CHARACTER OF THE PERUVIAN PEOPLE.

The hospitality of the Peruvian people is acknowledged by all Europeans who have visited Peru. They are also very charitable, as testified by the numerous institutions supported by voluntary contributions.

The Peruvian ladies are well known for their domestic attachment and patriotism. Their merits were admirably displayed during the late war, when they made great sacrifices for their country's cause, by giving up, not only their money, but their jewellery and other valuables.

Eminent English and German travellers to Peru have testified to the noble and genial character of the Peruvian ladies.

Dr. Hutchinson, late H.B.M. Consul to Peru, in his work, "Two Years in Peru," says:—"Much has been said, and with very good reason, of the beauty of the ladies of Lima. During my two years' residence out there, I have seen many of them exceeding, in every grace of womanhood, even the angelic designs of Dr. Fuentes' work. But as I know a good deal has been written condemnatory of their moral character, for which depreciation I believe there exists little foundation, I consider it my duty to protest against such unmanliness. I have often heard the changes rung upon the same topic, in reference to Paraguay, the Banda Oriental, and the Argentine Republic, with all of which I am acquainted for fifteen years; and I have no hesitation in saying, from my experience of South America, that not only regarding Peru but elsewhere, within my knowledge, they are perfectly foundationless and equally untrue."

The ladies of Lima, in addition to their unimpeachable *morale*, can count amongst them numbers of high literary celebrity.





A PARTY OF LADIES AND GENTLEMEN OF LIMA GIVING A CONCERT FOR A CHARITABLE PURPOSE.

1972 March 4 noon

Stevenson says, *op. cit.*, vol. i, p. 390 :—"Chastity is more common, and infidelity more uncommon, amongst the Peruvians than in most countries of the Old World."

Doctor von Tschudi, the great German traveller, thus describes the beauty of the Peruvian ladies :—"Nature has lavishly endowed them with many of her choicest gifts. In figure they are unusually slender, and rather tall ; and they are especially remarkable for small, elegantly formed feet. Their fair faces are animated by large, bright, dark eyes. Their features are pleasing ; the nose being well formed, though in general not small ; the mouth invariably adorned with two rows of brilliant white teeth ; and their long black hair, arranged in plaits, falls gracefully over the bosom and shoulders. Add to all this a captivating grace of manner and deportment, joined to an exceeding degree of gentleness and amiability, and it will be readily admitted that the Limeña (a Lima lady) is a noble specimen of female loveliness."

PERIODICAL PUBLICATIONS.

The following are DAILY newspapers :—*El Comercio, El Nacional, La Opinion Nacional, El Bien Publico, La Epoca, El Perú, El Artesano.*

BI-WEEKLY :—*El Sol, La Voz Monastica.*

WEEKLY :—*Revista Catolica, El Progreso, Perlas Flores, Revista Social, La Luz Electrica, L'Echo du Perú.*

FORTNIGHTLY :—*El Monitor Medico, El Alteneo de Lima, La Voce d' Italia.*

MONTHLY :—*La Revista Masonica, La Cronica Medica, La Gaceta Cientifica, Boletin de Minos, Boletin de la Academia, Libri de Medicina, La Homeopatica, La Ilustracion Popular, La Rosa del Perú, Boletin de Adnanas, El Peruano* (Official Gazette).

CHAPTER XII.

Emigration Laws.

LAW FOR EUROPEAN IMMIGRATION OF 1873.

UNDER the enlightened government of Don Manuel Pardo, in 1873, statutes were drawn up, and a Society organised called the European Immigration Society, divided into five sections, for the purpose of establishing European colonies in Peru, as follows:—

1. England and Ireland.
2. France, Belgium, and Switzerland.
3. Germany, Austria, and Holland.
4. Sweden, Norway, and Denmark.
5. Italy, Spain, and Portugal.

The following is a copy of the law passed by Congress:—

MANUEL PARDO, CONSTITUTIONAL PRESIDENT OF THE
REPUBLIC.

Whereas the Congress has passed the following law:—

The Congress of the Peruvian Republic considering:—

It being unquestionable that immigration contributes to the prosperity of nations, has passed the following law:—

ARTICLE 1.—The Executive Power is hereby authorised—

- (1.) To expend the sum of 100,000 soles yearly in the encouragement of European immigration, on the basis which may be most suitable to each nation and to each kind of labouring class.
- (2.) To distribute to the immigrants irrigated lands belonging to the nation.

- (3.) The colonists will be obliged to repay the Treasury the expenses they may occasion, excepting those of transport, according to the conditions the Government may establish.

Given in the Government House, Lima, the 28th day of April, 1873.

(Signed) { MANUEL PARDO, *President*.
 { FRANCISCO ROSAS, *Minister of the Interior*.

According to the report of the Society, issued in 1876, 916 immigrants were sent from Europe, of which 856 were Italians, 35 Spaniards, 17 French, 1 German, and 7 miscellaneous nationalities. These were successfully established in various parts of the country, 380 of them being located in the Chanchamayo valley—the cost of their passage, implements, seeds, and materials, &c., being defrayed by the Peruvian Government—where they cultivate coffee, cocoa, rice, maize, tobacco, vanilla, plantains, pines, yucas, camotes (kind of potato), papayas, &c., and possess horses, mules, pigs, cows, and poultry. Notwithstanding the attacks they at first received from the Indians (Chunchos), the colony is now progressing favourably, and is the first step for more extensive colonisation.

EMIGRATION TO PERU.

Extract from Report of the Peruvian Commissioners at the Agricultural Congress of Paris, 1878.

The important question of immigration, and principally that of establishing European colonies in Peru, is one of those questions the solution of which interests in the highest degree the agricultural and commercial industries of the country in general, as well as its economic future; it is for this reason that the Peruvian Government endeavours to favour immigration by all possible means. Up to the present time—if it is true that the efforts of the Administration have been crowned with a certain amount of success, since many immigrants have already settled in Peru—it is none the less true

that this result does not appear, however, to be altogether satisfactory, especially when we compare the immigration to Peru with that which flows from the Old Continent, for example, to the United States, Brazil, and the Argentine Republic. Peru offers to colonists, as much by its agriculture as by its mines, conditions as advantageous, if not better, than those of any of the countries of North and South America can offer them. The Peruvian people are affable and kind. In temperament they sympathise well with the European. How could it happen otherwise, when Peruvians of the well-to-do class are of European origin? Their habits and customs are those of the European race, their tendencies and aspirations the same. Peruvians see in the European immigrant a brother; they open their arms and offer him the greatest hospitality. The Peruvian Legislation is one of the most liberal, having been built up upon those of several European nations. The laws reconcile exclusive rights to nobody: *foreigners and native subjects are treated upon the same footing.*

"The State, with the object of favouring immigration, makes gratuitous concessions of land to the colonists, on conditions especially advantageous, and such as no other country can equal. The Houses of Assembly and Representatives have at various times voted considerable sums of money for the purpose of increasing and facilitating European immigration. In fact, the expenses of transport of the immigrants from their countries to the place of colonisation have been entirely defrayed by the State, which, moreover, has paid to the colonists a certain daily sum of money, and has supplied them with implements, tools, seeds, and domestic animals on very advantageous conditions, according to the regulations of the Immigration Society. Notwithstanding all these advantages, immigration to Peru has only been in limited numbers, and not in proportion to the advantages that the country offers. Amongst the primary causes of this, the principal obstacle to European immigrants coming to Peru is the great distance that they have to travel before arriving at the place of their destination, in comparison with that which separates them from the United States, Brazil, or the Argentine Republic. When emigrants embark at their own expense, it is the

question of economy in money and time, which places them in the necessity of preferring the nearest centres of colonisation. Another cause is that Peru is one of the Republics in South America the least known and appreciated in its just value. Its institutions, far from being in decay, have entered the broad path of progress, and it is a country a hundred times, or rather a thousand times, richer than many think it to be."

"The Peruvian Government reserves the works on the coast for the Chinese immigrants, directing all its efforts for European colonisation to one of the most beautiful and most fertile regions of the whole world,—the *Chanchamayo Valley*. This region is situated on the eastern descent of the Andes, about 300 kilomètres (186 miles) from Lima. It belongs to the great valley of the Amazon, and more especially to the Ucayali, the principal affluent of the Amazon. This valley takes its name from the principal river which waters it, the Chanchamayo, formed by the junction of the Tulumayo and the Ulcumayo. The Chanchamayo,—the general course of which is more or less W.N.W.,—receives on its left bank the waters of the Paucartambo, where it takes the name of Perene, which runs in an easterly direction, and afterwards receives, on its right bank, the Ene, formed by the Apurumac and the Montaro; it continues the same course, under the name of the Tambo, and afterwards, flowing northerly, it unites with the Urubamba to form the Ucayali, which, in junction with the Marañon, constitutes the greatest river of the globe, known under the name of the Amazon. It is to the high part of the valley, watered by the Chanchamayo, Perene, and the Tambo, and their branches, that the Peruvian Government directs European emigration.

"Although the climate of the Chanchamayo is warm and humid, it is, nevertheless, well known to be very healthy, and hence it is that efforts have for a long time been made to profit by its very advantageous conditions. A line of railroad which is to unite the Pacific coast with the fruitful zone of the Montaña, and with other centres not less important from a mineral point of view, has already reached the summit of the Cordilleras, where the locomotive gives forth its shrieking whistle after rising to the height of 4,800

mètres (15,744 feet) without having to pass over a steeper gradient than four per cent. ; in spite of that the direct distance that it passes does not exceed 170 kilomètres (105½ miles). The Transandean Callao-Lima Oroya Railroad, which, without contradiction, is one of the boldest undertakings that has been constructed up to the present time, will shortly place the rich Chanchamayo region in communication with the Pacific coast. This fertile valley can also be placed in connexion with the Atlantic, by means of steamers which navigate the Amazon, and which, proceeding up the Ucayali, the Tambo, and the Perene, come within some twenty leagues of the centre of the colony; or better, from the Ucayali, entering by the Pachetea, they can reach the waters of the Pichis, at the foot of the northern slope of the Cerro de la Sal (Salt Hills).

"Administratively the Chanchamayo district is situated in the province of Tarma, under the jurisdiction of the Junin Department. The geographical position of Fort San Ramon, situated at the angle formed by the confluence of the Tulumayo and the Oxabamba, to form the Chanchamayo, is at a height of 825 mètres (2,706 feet) above the level of the sea, and, according to Werthemann, is 11° 6' 33" lat. S., and 77° 37' 36" long. W. from the meridian of Paris. The present centre of the colony is La Merced, situated on the left bank of the Chanchamayo about eight kilomètres down the river from the San Ramon fort. This town, which at present numbers about 300 colonists, stands 730 mètres (2,400 feet) above the level of the sea, and occupies the site of an old Indian encampment.

"The climate of the Chanchamayo valley, as we have already said, is warm and humid. Rain falls in this valley frequently and copiously from October or November to April or May. The days are tolerably warm, and the nights somewhat cool. The maximum and minimum temperature varies between thirty and sixteen degrees centigrade. The mean annual temperature can be based upon regions climaterically analogous, comprised between twenty and twenty-one degrees centigrade. In spite of the high temperature, during the dry season the air remains almost saturated with humidity, and the wet and dry bulb thermometers show but little difference of temperature, according

to the result of the observations made by A. Werthemann. From a hygienic point of view, this warm and humid climate, without rigorous winters to invigorate the organism, would appear to be unhealthy for Europeans, compared with analogous climates, in which the white man has to abstain from hard and continuous work. Nothing of this kind is, however, manifested here; epidemic complaints are altogether unknown in Chanchamayo. This exceptional circumstance removes from this locality the inconveniences of its intertropical situation, preserving for it the advantage of being a healthy region. This is, no doubt, owing to its height, which reaches to 1,000 mètres (3,285 feet), and this situation makes it accessible to the fresh breezes from the east, which during the day moderate the heat of the sun, and prevents the stagnation of the miasms which would otherwise be formed under the combined and destructive influence of heat and humidity. The intermittent winds which blow on the Cordilleras also refresh these valleys. The absolute absence of epidemics in the Chanchamayo valley, and the freedom with which the white man can support himself there, working in the sun, without too much fatigue and without injury to his health, as has been proved by experience of over twenty years, that is, from the time when the first colonies were established in this valley, demonstrate that the presumed unsuitability of colonising the regions of the torrid zone with European populations is without foundation.

“The establishment of European colonies in the Chanchamayo and in the neighbouring regions, appears to us, at once, a solved problem, and as such, from under other points of view, a problem which interests greatly the economic condition of Peru, and explains at once the efforts which the Government are making to colonise these regions, and the considerable expense which has been incurred in the construction of a line of railway across the steep summit of the Cordilleras, a gigantic work, the transcendental importance of which is far from being appreciated.”

EMIGRATION TO PERU.

The laws of Peru allow European immigration, and grant protection to foreigners in building on their property equally with natural-born citizens.

The Peruvian Government grants 250,000 square mètres of land free to every able-bodied person, upon condition that it is brought into cultivation.

CODIGO CIVIL OF PERU.*Extracts from the Civil Code of the Laws of Peru relating to Peruvian and Foreign Subjects :—*

Art. 30.—The Constitution designates who are Peruvians, and who are foreigners.

Art. 31.—All Peruvians enjoy civil rights, unless they are such persons upon whom the law expresses prohibition.

Art. 32.—The civil rights are independent of the quality of citizens. (In whatever station of society a person may be, all enjoy the same rights.)

Art. 33.—Foreigners enjoy in Peru all the rights appertaining to the security of their persons and of their goods, and the free administration of the same.

Art. 34.—The acquisition of immovable property and the conditions of the trading of foreign subjects will depend on the treaties concluded with their respective nations, and of the laws and special regulations made.

Art. 35.—As regards the succession of foreign subjects, what is laid down in the chapters relative to the same in this code will be observed.

Art. 36.—No inhabitant of Peru can exempt himself from the fulfilment of the obligations contracted in the Republic made in conformity with the laws.

Art. 37.—Peruvians as well as foreigners domiciled in Peru, wherever they may be, can be cited before the tribunals of the Republic for the fulfilment of the contract which they may have entered into, even if in a foreign country, on matters which the laws of Peru allow to be contracted.

Art. 38.—Foreigners who may happen to be in Peru, although not domiciled, may be compelled to fulfil any contract entered into with a Peruvian, although in a foreign country, upon matters which may not be prohibited.

Art. 39.—The foreigner, although he may be absent from the Republic, may be cited before the tribunals of it. 1st. When the matter treats of any action concerning goods which are in Peru ; 2nd. When it treats of any civil action, in consequence of crime or of a fault, which the foreigner may have committed in Peru ; 3rd. When it treats of an obligation contracted with the foreigner, in which it may have been stipulated that the tribunals of Peru should decide the controversies relative to it.

Art. 40.—Whenever the matter treats of an obligation contracted in a foreign country, the laws of the country where it has been entered into will serve to adjudicate upon the contract, in so far that it may not be prohibited by the laws of Peru. The laws of Peru will only have effect when the contracting parties submit themselves to them.

Art. 41.—A Peruvian woman married to a foreigner, or a foreign woman married to a Peruvian, follow the condition of their husbands. If they so wish, the first may recover, and the second may keep, the quality of Peruvian citizenship, providing they reside in Peru.

Art. 42.—The privilege of civil rights may be suspended or lost, whenever a person may be so prohibited by the law.

Art. 43.—There cannot be solicited in Peru the fulfilment of obligations contracted between foreigners in a foreign country, except in the event that both parties submit themselves to the tribunals of the Republic.

The Civil Code lays down the law upon all matters referring to commercial transactions, &c., and a copy is deposited in all the Peruvian consular offices in England.

PROTECTION TO FOREIGNERS IN PERU.

LAW AFFECTING EMIGRATION.

The following is the communication made to MR. THOMAS J. HUTCHINSON, late H.B.M. Consul in Peru, by the chief law officer, SEÑOR PAZ SOLDAN, on the above subject.

Citizenship in Peru is obligatory on no one, nor is it denied without a just cause. To effect it there is first required the desire and request of the foreigner. The wish to be naturalised as a Peruvian must be first expressed ; he must be twenty-one years of age, and possess some profession or trade, besides which he must be inscribed on the Civil List in the form prescribed by law. (Article XXXV. of the Constitution.)

Article XIX. of the Civil Register regulations sets forth the formalities, which are exceedingly easy and liberal, where-with such an inscription is to be made. There have been established, and are in operation at the present time, many mercantile companies, many industrial, farming, manufacturing, saltpetre, mining, navigation, irrigation, and railway undertakings, whose promoters, owners, and agents are not citizens of Peru. Many other persons belonging to different countries have entered into contracts with the Government concerning various works, and have solicited and obtained the concession of privileges, in whose quiet possession they still are. It may be said that the greater part of the riches of Peru, and the most lucrative enterprises, are in the hands of foreigners without their having been called on to take out their papers as citizens. Foreign capital, which has been spent in taking advantage of the various kinds of resources that the country possesses, can reckon on every assurance of legal guarantees. Regarding many of these the nation has guaranteed them interest, which is a favour that has seldom been granted to the natives of the country.

The advantages and protection which foreigners find in Peru have led some of them to believe that they were in a better position, and even more privileged, than our own people. On this account some have pretended that political disturbances should not affect them, or that the State

should indemnify them for the losses which are the result of civil conflicts ; in short, that there should be for them a special legislation, which in their own country they cannot find, and which they would look for in vain. These are facts which are patent and known to all ; they are more decisive and conclusive than any measures that could be brought forward to prove that foreigners possess in Peru every guarantee that can be desired in the following of their trade and the employment of their capital. Contracts entered into with them are scrupulously carried out, and justice is done when a proper claim is presented ; they are on this account content with Peru and with its Government. If they ever suffer in person or interests it is not from the fault of the Administration, but because passions, vices, and crimes are common to men and peoples ; it is a fatal leprosy which affects the human race spread over the face of the globe.

Between the Government of Peru and that of Her Britannic Majesty there exists a treaty of friendship, commerce, and navigation, in which the rights, guarantees, and protection which the subjects and citizens of both countries are to enjoy when residing in either territory are declared. The ordinary laws of Peru concede to British subjects greater and more extensive rights than are set down in that treaty. They can freely enter Peru, reside where they like, get married, make a will, and dispose of their property as they wish, or, dying intestate, their heirs are protected. They can inherit real or personal property, obtain exclusive privileges, carry on manufactories, or establish any kind of industry, but subject to the same laws.

The Fiscal has gone into the foregoing explanations to satisfy the desire of the Honourable Chargé d'Affaires of Her Britannic Majesty on the one hand. They are favourable to his industrious countrymen who come to live in this country, bringing with them as capital their trades, economy, and work, under the protection of our laws. On the other hand, they are for the benefit of the country itself, and principally because at the time when a law affecting foreign emigration has been passed, emigrants may be aware of the guarantees, rights, liberties, and protection which they may hope for on arriving in Peruvian territory.

The desire of the Peruvian Government to encourage European colonies is testified in the Bill which passed Congress in 1873, when the sum of 40,000 soles, or about £8,000, was voted to bring some schoolmasters to Peru from Europe.

A large number of English artisans have for many years been established in Peru, living there on affectionate terms with the people, connected with the important English commercial companies, amongst which are the Pacific Steam Navigation Company, the Callao Dock Company, the Callao and Lima Railway, the West Coast of America Telegraph Company, and others, besides which many private commercial firms hold large estates in Peru, who employ many Englishmen.

TREATY OF FRIENDSHIP, COMMERCE, AND NAVIGATION BETWEEN GREAT BRITAIN AND PERU.

Celebrated the 10th of April, 1850, as follows :

ARTICLE I.

There shall be perpetual friendship between the Republic of Peru and her Majesty, Queen of the United Kingdom of Great Britain and Ireland, her heirs and successors, and respective citizens.

ARTICLE II.

There shall be reciprocal liberty of Commerce between the territories of the Republic of Peru and the dominions of Her Britannic Majesty. The citizens and subjects of both countries respectively will enjoy full liberty and security to enter with their ships and cargoes in all places, ports, and rivers of the territories of the other, in which is permitted, or will be permitted with other nations. Both may establish themselves, and reside in whatever part of the said territories respectively, hire, and occupy houses and stores that they may require, and trade either by wholesale or retail in all classes of productions, manufactures, and merchandise of legitimate commerce, enjoying the same exemptions and privileges as the citizens and natural subjects, submitting themselves, however, to the same laws, decrees, and established uses to which the citizens and natural subjects are subject. In the same manner the ships of war and mail ships of each country respectively, will have liberty to enter in all ports, rivers, and places of the territories of the other, in which is permitted, or may be permitted to enter ships of war, and mail steamers of other nations; and can anchor, remain and repair in them, subject always to the laws and regulations of the respective country. Coast-wise traffic is not included, which each country reserves for itself respectively, and which they will regulate according to their own peculiar laws.

ARTICLE III.

The two contracting parties agree that in whatever favour, privilege, or exemption of commerce or navigation which may have been ceded, or may in future be conceded to the citizens or subjects of the other States, it will make extension to the citizens or subjects of the other contracting party gratuitously, if the concession in favour of the other State has been gratuitously, or by means of an equivalent compensation, if the concession may have been conditional.

ARTICLE IV.

There will not be imposed other or higher duties on the importation in the Republic of Peru of any article, production, or manufacture of the dominions of Her Britannic Majesty, neither will be imposed other or higher duties on the importations in the dominions of Her Britannic Majesty of any article, production, or manufacture of the Republic of Peru, than those which are paid or will be paid for the same article, production, or manufacture, of any other foreign country, neither will they impose other or higher duties in the territories or dominions of each one of the contracting parties, on the exportation of any article for the territories or dominions of the other, than those which are paid, or will be paid, on the exportation of the same article for any other foreign country. There will not be prohibited the importation of any article, production, or manufacture of the territories of each one of the contracting parties, in the territories of the other, without that the prohibition is extended equally to the importation of the same article, production, or manufacture of any other country, neither will be prohibited the exportation of any article of the territories of each one of the contracting parties to the territories of the other without the prohibition be extended equally to the exportation of the same article, production, or manufacture for the territories of all other nations.

ARTICLE V.

They will not exact other or higher duties on account of tonnage, lights, port, pilotage, and salvage, in cases of damage or shipwreck, or other local charges, in the ports of the Republic of Peru on British ships over 200 tons, than those that are paid in the said ports by Peruvian ships of the same burthen, or in the ports of the territories of Her Britannic Majesty to Peruvian ships of over 200 tons burthen, than those that are paid in the same ports by British ships of like burthen.

ARTICLE VI.

The same duties will be paid for the importation in the Republic of Peru of any article that can be legally imported, if the said importation be made in British ships, as if it be made in Peruvian ships; and the same duties will be paid for the importation in the dominions of Her Britannic Majesty of any article that can be imported legally if the said importation be made in Peruvian ships, as if it be made

in British ships. The same duties will be paid, and the same discounts, premiums, and liberties will be conceded on the exportation to the Peruvian Republic of any article that may be legally exported, if said exportation be made in British ships, as if it be made in Peruvian ships; and the same duties will be paid, and the same discounts, premiums, and privileges will be conceded on the exportations of the dominions of Her Britannic Majesty of any article that may be legally exported, if said exportation be made in Peruvian ships as is made in British ships.

ARTICLE VII.

The merchants, captains of ships, and all citizens or subjects of both countries respectively, will have, in the territories of the other, full liberty to manage for themselves their businesses, or confide to the person they wish to employ as agent, broker, factor, or interpreter, and without that they may be obliged to employ other persons than those that employ the natural born of the country, or to pay to those that they employ greater salary or remuneration than pay in like cases the same natural born subjects. The Peruvian citizens in the dominions of Her Britannic Majesty, and the subjects of Her Britannic Majesty in Peru, will enjoy full liberty, as that which now enjoy, and the same that in future will enjoy the natural born subjects of each country respectively, to buy and sell to whom they wish the effects of legal commerce, and fix the prices which may appear to them, without that can be prejudiced by any privilege granted to other individuals to buy or sell; subjecting themselves, however, to the contributions or general taxes established by law. The citizens and subjects of each one of the contracting parties will enjoy in the territories of the other the most efficacious protection in their persons and properties; may have recourse to the tribunals of justice to reclaim what may be expedient for their rights; and can employ in all their causes lawyers, procurators, or agents of whatever kind they may deem expedient, enjoying in this respect the same rights and prerogatives as the natural born citizens or subjects.

ARTICLE VIII.

In all that has relation with the Council authority of the ports, shipping, discharge of the ships, deposit and security of their cargoes, products, and effects, succession of goods, furniture, by will or of other manner, and free disposition of any property, furniture, by sale, gift, exchange, or by will or of any other mode, as well as by what is done to the administration of justice, the citizens and subjects of each one of the contracting parties will enjoy, in the territories and dominions of the other, the same privileges, freedom, and rights as the citizens and natural subjects, and will not be subject in such cases to pay other or higher duties than those that are paid or will be paid by the respective citizens or natural subjects, subjecting themselves always to the laws and local statutes in force in said territories or dominions. If any citizen or subject of one of the contracting parties die intestate in the dominions or territories of the other, the consul-general, consul, or vice-consul of the nation to which the deceased has belonged, in

benefit of the legal heirs or creditors, and as much as the laws of each country may permit it, can take charge of the goods that the deceased may have left, until there may be named an administrator or executor in conformity to the laws of the country in which the death may have taken place.

ARTICLE IX.

The citizens of the Republic of Peru in the dominions of Her Britannic Majesty, and the subjects of Her Britannic Majesty in the Republic of Peru, will be exempt from all forced military service either on land or sea, and of all loan, exaction, or military requisition, and cannot be obliged to pay, under any pretext, neither other or higher imposts or ordinary contributions than those that are paid or will be paid by the natural citizens or subjects.

ARTICLE X.

Each one of the two contracting parties agrees not to take knowingly into his service, or retain in it, the citizens or subjects of the other that may have deserted from naval or military service, and on the contrary, will expel such from its service whenever required by the other to do so. In case of deserting from ships, the authorities are to give assistance to apprehend and restore them.

ARTICLE XI.

provides for permission of consuls to reside in each country for the protection of commerce.

ARTICLE XII.

provides for the protection of the commerce and subjects in case of war ; citizens of each country will be allowed six months for those residing on the coast, and one year for those in the interior, to settle up affairs and accounts. All citizens may remain in the country unmolested ; neither the debts or public funds, or the shares in companies are liable to confiscation or embargo.

ARTICLE XIII.

provides for the enjoyment of full liberty as regards religious creeds.

ARTICLE XIV.

In case of shipwreck the goods to be faithfully delivered over to the owner.

Signed in London, April 10, 1850. { PALMERSTON.
J. DE OSMA.
H. LABOUCHERE.

CHAPTER XIII.

Trade between England and Peru.—Commerical Statistics.

THE PACIFIC STEAM NAVIGATION COMPANY.

THE entire service of mail and passenger steam communication along the coast of Peru is served by an English company known as the Pacific Steam Navigation Company. This company was organised in 1839, and commenced their operations with two steamers, the *Peru* and *Chili*. Although, at first, the promoters suffered loss, it soon recovered, and the company, under skilful management at home and in Peru, has risen by degrees to become one of the largest and best-paying of English steamship companies afloat. The growth of trade between England and Peru is exemplified by the fact that this company has now a fleet of no less than forty steamers, which are employed along the coast of Peru, and with England *viâ* the Straits of Magellan, with a tonnage of 96,844, employing 2,500 hands. The company's headquarters in Peru are at Callao, where they have extensive engineering works for the repairing of their fleet, a steam-laundry, a bakery, and a butchery with yards for cows and sheep, for provisioning their ships. The company employ at Callao a large staff of no less than 200 English mechanics, who form an important colony, reside in houses erected by the company, and possess their own hospital and theatre.

The coast of Peru is one of the most healthy quarters of the globe, and the large staff ashore, as well as that afloat,

enjoy as perfect health there as in Europe. The company runs steamers weekly from Callao to Panama in connexion with the Royal Mail Steamers leaving Colon twice a month for Southampton, and also with the Pacific Mail Companies' line of steamers *viâ* New York, and the French Packet *viâ* St. Nazaire. The steamers leave Liverpool every alternate Wednesday, calling at Bordeaux on the Saturday, and at Lisbon the Wednesday following, and touching at Rio Janeiro and Monte Video. The steamers of this company bring to England from Peru large quantities of sugar, wool, cotton, and silver ore, besides bark, orchilla, and other valuable produce. They take back to Peru full cargoes of English manufactured goods. The importance of the trade between England and Peru is illustrated by this company's business.

THE AMAZON STEAM NAVIGATION COMPANY.

The company's fleet comprises 25 steamers, from 300 to 1,000 tons. The company commence their service at Para. There are three services monthly to Manáos, the principal city on the Amazon, the distance from Para being 927 nautical miles.

From Manáos there are steamers leaving once or twice a month for Iquitos, which is about 1,150 nautical miles from Manáos.

The following vessels comprise the company's fleet :—

Vessel.	Tonnage.	Nom. H.-P.	Vessel.	Tonnage.	Nom. H.P.
Marajo	1,039	240	Mauá	681	150
Belem	681	180	Icá	681	150
Manáos	681	180	Cametá	681	150
Ycamiaaba	414	100	Ituxy	289	130
Obidos	414	100	Pará	680	130
Inca	414	100	Dom Pedro II.....	555	90
João Augusto	240	160	Imperatriz Theresa.	775	130
Amajas	240	140	Juruty (screw)	164	60
Moju	270	50	Santarem (twin screw)	690	150
Madeira	680	180	Macapa	690	150
Andira	351	100	Princesa Isabel,,	763	134
Ariman	142	95	Conde d'Eu	689	125
Jurua	351	100			

TRADE BETWEEN ENGLAND AND PERU.

SUGAR IMPORTS.

Sugar is now extensively grown in various parts of the Republic, and has become an important industry. In the north, around Truxillo, Chimbote, and Lambayeque, the canes can be cut within six months after planting. The labour employed is chiefly Chinese.

The following have been the importations into England of sugar from Peru, 1870-1886 :—

	Bags.	Tons.	Value £ Sterling.
1870	2,510	251	5,020
1871	43,500	4,350	87,000
1872	65,500	6,550	131,000
1873	159,500	15,950	319,000
1874	237,000	23,700	512,112
1875	500,000	50,000	1,000,000
1876	503,000	55,030	1,390,700
1877	633,700	63,370	1,901,000
1878	565,000	56,500	1,204,648
1879	714,000	71,400	1,370,979
1880	495,000	49,503	1,115,768
1881	433,633	43,363	713,661
1882	431,888	43,188	702,923
1883	344,786	34,478	464,221
1884	265,652	26,565	316,154
1885	448,155	44,815	440,846
1886	329,697	32,969	335,755
Total...	6,172,521	621,982	£12,010,887

Amount of Specie (Silver Coin and Bars, Gold Bars, Dust, &c.) imported into England from Peru at the port of Southampton alone, from 1864 to 1886.

	Value £. Sterling.		Value £. Sterling.		Value £. Sterling.
1864	1,121,809	1872	32,804	1880	234,540
1865	1,004,636	1873	290,221	1881	.....
1866	1,122,053	1874	307,571	1882	.....
1867	1,064,731	1875	547,001	1883	.....
1868	664,017	1876	629,115	1884	299,000
1869	222,796	1877	633,000	1885	191,888
1870	384,762	1878	617,000	1886	440,667
1871	263,548	1879	167,293		
	5,848,352		3,224,005		1,166,095

Total amount of specie imported at Southampton alone, from Peru, from 1864 to 1886, £10,238,452.

Importations of Alpaca Wool to England from Peru during the years 1881 to 1886.

Year.	Imports.	Sales.	Stock.	Stock including inferiors.	Current Prices.	
					Arequipa.	Tacna.
	pkgs.	pkgs.	pkgs.	pkgs.		
1881	19,613	22,507	fleece 10,872 inferior 1991	12,863	1/3 to 1/5	1/0½ to 1/2½
1882	38,451	40,624	fleece 10,653 infer. 1,080	11,733	1/1½ to 1/3	1/1½ to 1/0½
1883	13,838	24,464	fleece 997 inferiors 9	1,006	1/2 to 1/5	1/1½ to 1/0½
1884	66,725	53,854	fleece 13,189 inferiors 887	14,076	1/0 to 1/3½	1/0 to 1/1
1885	33,792	33,054	fleece 13,253 inferior 717	13,970	1/1½ to 1/1½	1/9 to 1/9½
1886	26,437	38,075	fleece 1,615 inferiors 125	1,740	1/1 to 1/1	1/0 to 1/0½

GENERAL EXPORTS FROM ENGLAND TO PERU DURING THE YEARS 1881-5.

Article.		Quantity Exported.					Value £ Sterling.				
		1881.	1882.	1883.	1884.	1885.	1881.	1882.	1883.	1884.	1885.
Apparel	value	...	...	...	...	...	8,526	11,907	12,343	13,264	9,055
Arms and ammunition .....	"	...	...	...	...	...	808	4,309	4,586	7,785	3,739
Sacks, bags .....	"	...	...	...	...	...	21,124	29,732	17,377	16,718	9,051
Caoutchouc .....	"	...	...	...	...	...	4,120	4,363	4,193	8,157	2,808
Railway wagons .....	"	...	...	...	...	...	946	11,893	9,045	20,315	2,165
Coal	tons	48,190	69,749	66,538	88,999	57,563	24,513	36,498	33,499	46,805	27,320
Cordage and string	cwt.	2,319	1,481	2,292	2,699	1,987	4,596	3,898	5,775	6,036	4,361
Cotton	lb.	30,700	23,700	36,200	41,400	29,300	3,823	2,785	4,749	5,772	3,166
"	yards	26,237,700	34,860,700	17,248,300	31,888,400	20,033,900	324,784	442,001	223,460	389,694	239,446
"	value	...	...	...	...	...	30,570	36,096	30,841	48,292	32,087
Earthenware .....	"	...	...	...	...	...	3,179	7,429	11,673	17,914	10,614
Hardware .....	"	...	...	...	...	...	11,579	19,341	20,268	21,145	12,241
Hats .....	"	...	...	...	...	...	1,738	3,074	2,453	5,035	6,212
Implements .....	"	...	...	...	...	...	3,959	5,411	5,959	12,169	6,233
Hemp goods	yards	1,236,600	580,300	217,800	418,900	569,100	13,207	6,041	2,294	4,497	4,452
Linens	"	378,600	359,900	189,100	317,200	232,900	10,621	10,507	5,573	10,283	6,837
Machinery	value	...	...	...	...	...	26,938	62,658	69,568	50,856	43,605

GENERAL IMPORTS TO ENGLAND FROM PERU DURING THE YEARS 1881-5.

Article.	Quantity.					Value £. Sterling.				
	1881.	1882.	1883.	1884.	1885.	1881.	1882.	1883.	1884.	1885.
Chemicals										
Copper metal	1,570	1,550	1,334	1,663	...	12,447	8,800	3,415	335	10,635
„ regulus	116	23	32	...	666	24,015	21,702	20,382	22,494	7,071
„ ore	945	769	291	789	13	5,740	690	1,148	...	260
Cotton	35,749	37,958	37,743	27,230	...	60,853	51,629	17,633	46,559	...
Cascarilla bark	10,439	8,654	2,508	1,950	36,258	129,664	137,531	132,033	92,607	121,495
Raw hides	1,102	2,408	1,383	1,594	2,557	163,028	105,225	40,772	23,301	28,258
Silver ore .....	...	...	...	...	1,555	3,599	7,260	4,305	4,700	5,138
Fine hides .....	...	...	...	...	...	29,382	51,058	74,558	48,307	58,174
Sugar	642,360	650,736	462,923	374,767	611,881	1,742	4,563	3,489	1,228	6,065
Tin ore	23	121	131	173	189	716,435	702,869	470,819	316,591	442,491
Bar tin	717	3,039	648	113	213	1,156	5,589	7,008	7,318	7,373
Wool, alpaca, vicuña, and llama	1,775,390	3,176,073	1,405,485	6,772,736	3,764,754	116,161	197,117	78,626	397,278	187,831
Sheep's wool	1,358,157	896,144	1,021,522	4,653,407	2,505,582	64,445	123,675	39,374	181,825	82,572
Other products .....	...	...	...	...	...	23,072	45,985	42,997	28,421	30,546
						1,354,782	1,477,770	939,527	1,171,429	988,588

THE FOLLOWING ARE AMONGST THE PRINCIPAL ENGLISH
COMPANIES AND MERCHANTS RESIDENT IN PERU.

The Pacific Steam Navigation Co.....	Callao.
Callao and Lima Railroad Co.	"
Callao Dock Company.....	"
London Bank of Mexico and South America	"
West Coast of America Telegraph Co.	"
Arica and Tacna Railroad Co.	Arica.
Messrs. Duncan Fox & Co.....	Paita and Callao.
" Graham, Rowe, & Co.	Callao.
" Bates, Stokes, & Co.	"
" Isaacs & Co.	"
" Raymond, Morrison, & Co....	"
" Grace Bros. & Co.	"
" Grunning & Co.	"
" E. Haines & Co.....	"
" H. Lambert & Co.....	"
" Fry & Sons	"
" Bailey Bros.....	"
" Blacker & Co.....	Payta.
Mr. C. Cox	Salaverry.
Messrs. Hope, Jones, & Co.	"
Mr. H. Clarke	"

LIST OF THE PRINCIPAL ENGLISH FIRMS TRADING
WITH PERU.

Messrs. Graham, Rowe, & Co....	Merchants	...	Liverpool.
" Duncan, Fox, & Co....	"	...	Manchester.
" Baring Bros.	"	...	London.
" C. de Murietta, & Co.	"	...	"
" A. Gibbs, Sons, & Co.	"	...	"
" J. H. Schröder & Co.	"	...	"
" Kleinwort & Co.	"	...	"
" Bates, Stokes, & Co....	"	...	Liverpool.
" F. W. Glover & Co....	"	...	Manchester.
A. R. Robertson, Esq.	Merchant	...	London.
Messrs. Rosing Bros.	Merchants	...	"
" Melcher, Rungs, & Co	"	...	"
" Horstman & Co.	"	...	"
" J. H. Burchard & Co.	"	...	"
The Union Bank of London ...	...	...	"

LIST OF THE PRINCIPAL ENGLISH FIRMS TRADING WITH
PERU—*continued.*

The London Bank of Mexico and South America .....	...	...	London.
Messrs. Fruhling & Goschen...	Merchants	...	"
" A. Morison & Co.	"	...	Liverpool.
" Warburg & Co.	"	...	Manchester.
" Mathison & Beausire...	"	...	Liverpool.
" Geo. Curling & Co. ...	"	...	London.
G. A. Witt, Esq.	Merchant	...	"
Messrs. Sharps & Wilkins	Merchants	...	"
" W. & J. Lockett	"	...	Liverpool.
" Geo. Rodger & Co. ...	"	...	Manchester.
" Leisler, Bock, & Greig	"	...	"
" S. Albrecht & Co.....	"	...	"
" Fry, Miers, & Co.....	"	...	"
" G. Roskill	"	...	"
" Kessler & Co.	"	...	"
" W. F. Dawson & Co.	"	...	"
" Spicer Bros.	Paper Manufacturers	...	Alton, Hants.
" A. King, Brown, & Co.	Merchants	...	London.
" G. Powell & Co.	"	...	"
" A. Levy & Co.	"	...	"
" David Storer & Sons...	"	...	"
" Haines, Batchelor, & Co.	"	...	"
" Bishop & Lacey.....	"	...	"
" Price Bros.	"	...	"
" Isaac & Samuel.....	"	...	"
" H. Kendall & Sons ...	"	...	"
" A. Lambert & Co. ...	"	...	"
" F. Huth & Co.	"	...	Liverpool.
Mr. W. H. Fletcher	Merchant	...	"
" E. Richter.....	"	...	"
Messrs. T. Williams & Co. ...	Merchants	...	"
" Brownells & Co.	"	...	"
" Hainesworth, Watson, & Co.	"	...	"
" Wideman, Brocher, & Co.	"	...	London.
Mr. C. T. Hegan	Merchant	...	"
Messrs. T. W. & J. Walker ...	Merchants	...	Wolverhampton.
" Mildred, Goyeneche & Co.	"	...	London.
" Goodall & Co.	"	...	"
" T. & H. Littledale & Co.	Produce Brokers	...	Liverpool.
" Littledale, Ragg & Co.	Wool Brokers	...	"
A. Guillaume, Esq.	Merchant	...	London.

MINING STATISTICS.¹*Published by the direction of the School of Mines, Lima.*

LIST OF MINING PROPERTIES (OWNED) AS REGISTERED IN THE
PADRON DE MINAS, CORRESPONDING TO THE SECOND
HALF OF THE YEAR 1886.

General Resumé.

Silver mines	1,171	Sulphur mines	12
Coal mines	70	Silver and zinc mines	4
Copper mines	66	Cinnabar mines	4
Petroleum mines	29	Pyrites mines	1
Silver and gold mines	25	Silver and quicksilver mines	1
Silver and lead mines	25	Gold washing	1
Silver and copper mines	20		
Gold mines	16		
Not specified	13	Total mines	<u>1,458</u>

MINERALS EXPORTED FOR THE YEAR 1885.

Silver ore	4,096,968,25 kil.
Argentiferous lead	455,012,00 „
Plata Piña, and in bars	7,190,21 „
Copper	164,038,00 „
	<u>4,723,208,46</u>

PORTS OF SHIPMENT.
Kil.

From Callao and its outports ...	3,624,693,00
„ Pisco	329,819,06
„ Mollendo ...	182,466,25
„ Salaverry ...	131,806,55
„ Pacasmayo ...	454,423,60

Total..... 4,723,208,46

MINERAL DEPOSITS.
Kil.

From Ancachs	1,924,618,00
„ Arequipa ...	8,152,25
„ Cajamarca ...	454,423,60
„ Huancavelica	112,244,39
„ Ica	203,076,67
„ Junin	250,032,00
„ Libertad	131,806,55
„ Lima	1,464,541,00
„ Cuzco	174,314,00

Total..... 4,723,208,46

¹ Extracted from "La Guia de Lima," 1887.

WITH DESTINATION TO THE FOLLOWING COUNTRIES.

To Germany.....	2,750,164,75 kil.
„ England	1,829,057,53 „
„ France.....	129,936,00 „
„ United States.....	209,00 „
„ Destination not specified	13,841,18 „
Total.....	<u>4,723,208,46 „</u>

SALT.

Respecting salt, Señor Habich, Director of the School of Mines, says that by pretty exact calculation the workings in the year 1885 amounted to 21,500 metrical tons, of which 8,000 tons were exported to Chili, Ecuador, and Colombia; the other portion has been distributed in the consumption of 2,700,000 inhabitants, at the rate of seven kilogrammes each person, and the rest in the industry of the amalgamation of silver, calculated at 50,000 kilogrammes.

Neither coal nor sulphur has been much worked.

Petroleum is abundant in the provinces of Payta and Tumbes, and is at present worked, but in a reduced quantity. In the year 1885, the Zorritos mines, the property of Señor Piaggio, produced, kerosene, 84,310 gals.; benzine, 3,600 gals.; lubricating oil, 7,200 gals.; dark oil, 72,000 gals., or, say, a total of 167,110 gals. = 670,000 litres.

CUSTOM HOUSE REVENUES.—LIST OF BRITISH CONSULS IN PERU.

CUSTOM HOUSE REVENUES OF THE REPUBLIC FOR THE YEAR 1886
COMPARED WITH THE YEARS OF 1876 AND 1866.

Year.	Callao.	Other Custom Houses.
	\$	\$
1866	2,876,473,71	1,033,245,54
1876	3,561,037,05	1,580,627,31
1886	3,362,918,03	

Showing that the receipts at the Callao Custom House have now assumed the same proportions, or nearly so, as before the war.

LIST OF BRITISH CONSULS IN PERU, 1887.

Charles Edward Mansfield	Consul-General ...	Lima.
George Wilson	Vice-Consul ...	Callao.
Octavius Stokes.....	Consul ...	„
Henry W. Isaacson	Vice-Consul ...	Lima.
Alexander Blacker	„ ...	Payta.
George E. Steel.....	Acting-Consul ...	Cerro de Pasco.
Frederic Robillard.....	Vice-Consul ...	Mollendo.
W. Valentin Fry	„ ...	San José.
Alexander Herlley.....	„ ...	Arequipa.
Olive G. Jones	„ ...	Pisco.
Geo. E. Steel.....	Acting-Consul ...	„
Fredk. Heaton	Vice-Consul ...	Guanape.

TELEGRAPH LINES WORKING AT THE PRESENT DATE.

Between Payta and Piura	70 kil.
„ Ferreñafe and Lima	959 „
„ Lima and Callao	13 „
„ „ and Chorrillos	15 „
„ Chinchá and Ica	115 „
„ Camaná and Sama	520 „
„ Mollendo and Arequipa	203 „
Under repair :—	
Between Piura and Ferreñafe (extension).....	330 „
„ Chorrillos and Chinchá	210 „
Total	2,435 „

The following are the places served by the lines of telegraph, at which there are telegraph stations :— Payta, Piura, Ferreñafe, Lambayeque, Chiclayo, Eten, Pacasmayo, Chocope, Trujillo, Salaverry, Chimbote, Casma, Huarney, Barranca, Supe, Huacho, Chancay, Lima, Callao, Chinchá, Pasco, Ica, Camaná, Quilca, Mollendo, Pacocha, Moquegua, Locumba, Sama and Arequipa. Peru is connected by telegraph with England and all parts of the world :—

POSTAGE BETWEEN ENGLAND AND PERU (INTERNATIONAL).

Letters for each	per $\frac{1}{2}$ oz. 4d.
Postal-cards	1 $\frac{1}{2}$ d.
Commercial Papers per 2 ozs. 1d., minimum...	2 $\frac{1}{2}$ d.
Newspapers, each	per 4 ozs. 1d.
Samples, for each (maximum weight) per 2 ozs. 1d.	
Printed papers of all kinds	per 2 ozs. 1d.

POSTAGES (INTERNAL).

Letters, for each fifteen grains, or fraction	10 cents.
Postal-cards	3 "
" " reply-paid	6 "
Printed matter, books, and illustrated periodicals, 15 grms.	6 "
Parcels, for each 50 grains, or fraction	8 "
Samples " " "	8 "

POSTAGES, LOCAL (IN THE TOWNS).

Letters, for each 15 grammes, or fraction	2 "
Postal-cards, each	2 "
" " reply-paid	4 "
Registration of all correspondence, in addition to the postage ..	30 "
Correspondence not prepaid is charged double postage.	

NATIONAL REVENUE AND EXPENDITURE 1887-1888.

RECEIPTS.

	S.
Customs	5,076,874
Post-office	167,760
Direct contribution	2,246,695
Railways	61,500
Telegraphs	39,000
Other receipts	500,008
	<u>S8,091,837.00</u>

EXPENDITURE.

Secretary of State.

	S.
House of Senators	70,420
Secretary of "	31,002
House of Deputies	132,622
Secretary of "	47,789
Executive Power	54,000
Ministry	73,660
Prefectures	280,872
Post-office	164,956
Telegraphs	57,564
Engineers	26,400
Police	1,523,954
Additional	41,676
Carried forward	<u>S 2,504,415.00</u>

NATIONAL EXPENDITURE—continued.

Brought forward S 2,504,415'00

Ministry of Justice.

	S.
Ministry	20,160
Library and National Archives.....	6,760
Universities	53,164
Worship	150,804
Justice	526,580
Penitentiary	37,076
School of Mines	39,000
Extraordinary expenditure	9,200
Public beneficence	1,873
Additional expenses	98,600

S 943,217'00

Treasury.

	S.
Ministry	36,120
Head Tribunal of Accounts	41,160
Casa de Moneda	21,240
Casas Fiscales.....	78,528
Extraordinary	25,000
Director - General of Customs and its Dependencias	333,320
Additional expenses	630,532

S 1,165,900'00

Ministry of War.

Ministry.....

S 24,900'00

Army.

Generals	S 37,320'00
Inspection of Infantry, Cavalry, and Na- tional Guard.....	22,080'00
Inspection and General Commandant of Artillery	8,040'00
Infantry regiments	698,088'00
Class schools	75,936'00
Cavalry squadrons	201,643'00
Medical corps	3,360'00
Artillery	133,179'20
Powder magazine	6,480'00
Saluting Batteries of Callao	2,880'00
War Office expenses	51,109'75
General expenses of the branch establish- ments.....	52,760'00
Accidental expenses	80,000'00
Army-clothing establishment.....	99,400'00
Military instruments	30,000'00

1,502,275'95

Carried forward S 6,140,707'95

NATIONAL EXPENDITURE—*continued.*

Brought forward S 6,140,707'95

Ministry of Foreign Affairs.

	S.	
Ministry	17,800	
Diplomatic and Consular Service	60,000	
Extraordinary expenses	10,000	
Additional	7,000	
		S 94,800'00

Navy.

Mayoria de Ordenes	10,174'40	
Section of captains	7,920'00	
Captains of ports.....	84,612'00	
Expenses for materials	17,118'50	
Steamer <i>Santa Rosa</i>	35,873'92	
Expenses for materials	30,000'00	
Fluvial Department of Loreto	9,360'00	
Steamer <i>Peru</i>	6,000'00	
		201,058'82
Additional expenses		362,986'00
		<u>S6,799,552'77</u>

SUMMARY.

Receipts.....	S8,091,837'00
Expenditure	6,799,552'77
Surplus	<u>S1,292,284'23</u>

PERUVIAN MONEY.

There is no gold circulation at the present time, which is in silver, and only one standard coin, called sole, which is divided into cents, or centavos.

	s.	d.	
A sole is worth	3	4	English money. ¹
A peseta „	0	8	„ the fifth of a sole.
25 centavo „	1	0	„
1 „ „	0	$\frac{1}{2}$	„

¹ The legal rate of exchange is 4s. in English, 5 francs in French. In May, this year, the sole was quoted in Lima at 2s. 11d. It falls and rises according to the price of silver, and the requirements of the Exchange Market.

POUNDS STERLING IN SOLES AT VARIOUS RATES OF EXCHANGE.

Per Sole.	£1.	£2.	£3.	£4.	£5.	£6.	£7.	£8.	£9.
Pence.	s. c.	s. c.	s. c.	s. c.	s. c.	s. c.	s. c.	s. c.	s. c.
44	5.45	10.91	16.36	21.82	27.27	32.73	38.18	43.64	49.09
43	5.58	11.16	16.74	22.33	27.91	33.49	39.07	44.65	50.23
42	5.71	11.43	17.14	22.86	28.57	34.29	40.00	45.71	51.43
41	5.85	11.71	17.56	23.41	29.27	35.12	40.98	46.83	52.68
40	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00
39	6.15	12.31	18.46	24.61	30.77	36.92	43.07	49.23	55.38
38	6.31	12.63	18.95	25.26	31.58	37.89	44.21	50.53	56.84
37	6.48	12.97	19.45	25.95	32.43	38.92	45.40	51.89	57.38
36	6.66	13.33	20.00	26.66	33.33	40.00	46.66	53.33	60.00
35	6.85	13.71	20.57	27.43	34.29	41.14	48.00	54.86	61.71
34	7.05	14.12	21.18	28.23	35.29	42.35	49.41	56.47	63.53
33½	7.16	14.33	21.49	28.66	35.82	42.99	50.15	57.31	64.47
33	7.27	14.55	21.82	29.09	36.26	43.43	50.91	58.18	65.45
32½	7.38	14.77	22.15	29.54	36.29	44.30	51.69	59.08	66.46
32	7.50	15.00	22.50	30.00	37.50	45.00	52.60	60.00	67.50
31½	7.61	15.22	22.83	30.44	38.05	45.66	53.27	60.88	68.49
31	7.73	15.46	23.19	30.92	38.65	46.38	54.11	61.84	69.57
30½	7.85	15.70	23.55	31.40	39.26	47.10	54.95	62.40	70.25
30	7.97	15.94	23.91	31.88	39.85	47.82	55.79	63.70	71.73
29½	8.08	16.16	24.24	32.32	40.40	48.48	56.56	64.64	72.72
29	8.21	16.42	24.63	32.84	41.05	49.25	57.47	65.68	73.89
28½	8.34	16.68	25.32	33.36	41.70	50.04	58.38	66.72	75.06
28	8.47	16.94	25.41	33.88	42.35	50.82	59.29	67.75	76.23
27½	8.60	17.20	25.80	34.40	43.00	51.60	60.30	68.80	77.40
27	8.74	17.48	26.22	34.96	43.70	52.44	61.18	69.82	78.56
26½	8.87	17.74	26.61	35.48	44.35	53.22	62.07	70.96	79.83
26	9.01	18.02	27.03	36.04	45.05	54.06	63.09	72.08	81.09
25½	9.15	18.30	27.45	36.60	45.75	54.90	64.05	73.02	82.35
25	9.29	18.58	27.87	37.16	46.45	55.74	65.03	74.32	83.61
24	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00

WEIGHTS.

In trade the old measures of Spanish origin are employed, their chief equivalents being :—

1 marco	=	about ½ lb.,	or correct English weight,	7'385 ozs.
2 „	„	1 lb.	„ „ „ „	14'770 „
1 arroba	„	25 lb.	„ „ „ „	25'320 lb.
1 quintal	„	100 lb.	„ „ „ „	101'280 „

WEIGHTS—*continued*.

1 cajon, or 60 quintals }	3 tons of 2,000 lb. each.
1 tonelada	1 ton, or correct English weight, 0'904 ton.
1 vara or yard	33 English inches.
1 pulgado, or inch ...	$\frac{1}{12}$ of an English inch.
1 cuadra	142'063 yards.
10,000 square varas...	2 $\frac{1}{2}$ acres.
1 league	3 miles, or 3'229 English miles.

LIQUID MEASURE.

1 cuartilla	7'549 gallons.
1 cuarta	1'046 pints.
1 frasco	0'523 gallons.
1 galon	0'836 "
1 barril	16'728 "
1 pipa	100'370 "

CORN MEASURE.

1 fanega	30'197 "
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APOTHECARIES WEIGHT.

1 grano	0'769 grains.
1 ovala	9'231 "
1 escrupúlo	0'923 scruples.
1 dragma	0'923 drachm.
1 onza	0'923 ounce.
1 libra medici	0'760 pound.
1 castellano	72 grains.

KILOMÈTRES AND MILES.

KILOMÈTRES INTO MILES.

Kiloms.	Miles.	Kiloms.	Miles.	Kiloms.	Miles.
1	0'621	12	7'453	50	31.05
2	1'242	13	8'074	60	37'26
3	1'863	14	8'695	70	43'47
4	2'484	15	9'316	80	49'68
5	3'105	16	9'937	90	55'89
6	3'726	17	10'558	100	62'10
7	4'347	18	11'179	200	124'2
8	4'968	19	11'800	300	186'3
9	5'589	20	12'421	400	248'4
10	6'21	30	18'63	500	310'5
11	6'831	40	24'84	1,000	621

MILES INTO KILOMÈTRES.

Miles.	Kiloms.	Miles.	Kiloms.	Miles.	Kiloms.
1	1'609	12	19'31	50	80'47
2	3'219	13	20'92	60	96'56
3	4'828	14	22'53	70	112'65
4	6'437	15	22'15	80	128'75
5	8'047	16	25'76	90	144'84
6	9'660	17	27'37	100	160'93
7	11'27	18	28'98	200	321'86
8	12'87	19	30'59	300	482'79
9	14'48	20	32'20	400	643'72
10	16'09	30	48'28	500	804'66
11	17'70	40	64'37	1,000	1,609'3

KILOGRAMMES INTO ENGLISH WEIGHT.

Grm.	kilogs	lb.	oz.	Kilogs	tons	cwt.	qr.	lb.	oz.
1	0	=	0	0'035	1	=	0	0	2 31
5	0	"	0	0'176	2	"	0	0	4 61
10	0	"	0	0'353	3	"	0	0	6 91
20	0	"	0	0'705	4	"	0	0	8 13
30	0	"	0	1'058	5	"	0	0	11 01
40	0	"	0	1'410	6	"	0	0	13 31
50	0	"	0	1'763	7	"	0	0	15 61
60	0	"	0	2'116	8	"	0	0	17 101
70	0	"	0	2'469	9	"	0	0	19 131
80	0	"	0	2'822	10	"	0	0	22 01
90	0	"	0	3'175	11	"	0	0	24 4
100	0	"	0	3'527	12	"	0	0	26 7
200	0	"	0	7'05	13	"	0	0	1 0 11
250	1	"	0	8'8	14	"	0	0	1 2 14
300	0	"	0	10'5	15	"	0	0	1 5 1
400	0	"	0	14'1	15	"	0	0	1 7 4
500	1	"	1	1'6	17	"	0	0	1 9 8
600	0	"	1	51	18	"	0	0	1 11 11
700	0	"	1	8'7	19	"	0	0	1 13 14
750	1	"	1	10'4	20	"	0	0	1 16 1
800	0	"	1	12'2	21	"	0	0	1 18 5
900	0	"	1	15'75	22	"	0	0	1 20 8

KILOGRAMMES INTO ENGLISH WEIGHT—*continued.*

Kilogs		tons	cwt.	qr.	lb.	oz.	Kilogs		tons	cwt.	qr.	lb.	oz.
23	=	0	0	1	22	11	71	=	0	1	1	16	8
24	"	0	0	1	24	15	72	"	0	1	1	18	12
25	"	0	0	1	27	2	73	"	0	1	1	20	15
26	"	0	0	2	1	5	74	"	0	1	1	23	2
27	"	0	0	2	3	8	75	"	0	1	1	25	5
28	"	0	0	2	5	12	76	"	0	1	1	27	9
29	"	0	0	2	7	15	77	"	0	1	2	1	12
30	"	0	0	2	10	2	78	"	0	1	2	3	15
31	"	0	0	2	12	5	79	"	0	1	2	6	3
32	"	0	0	2	14	9	80	"	0	1	2	8	6
33	"	0	0	2	16	12	81	"	0	1	2	10	9
34	"	0	0	2	18	15	82	"	0	1	2	12	12
35	"	0	0	2	21	3	83	"	0	1	2	15	0
36	"	0	0	2	23	6	84	"	0	1	2	17	3
37	"	0	0	2	25	9	85	"	0	1	2	19	6
38	"	0	0	2	27	12	86	"	0	1	2	21	9
39	"	0	0	3	1	15	87	"	0	1	2	23	13
40	"	0	0	3	4	3	88	"	0	1	2	26	0
41	"	0	0	3	6	6	89	"	0	1	3	0	3
42	"	0	0	3	8	9	90	"	0	1	3	2	7
43	"	0	0	3	10	13	91	"	0	1	3	4	10
44	"	0	0	3	13	0	92	"	0	1	3	6	13
45	"	0	0	3	15	3	93	"	0	1	3	9	0
46	"	0	0	3	17	7	94	"	0	1	3	11	4
47	"	0	0	3	19	10	95	"	0	1	3	13	7
48	"	0	0	3	21	13	96	"	0	1	3	15	10
49	"	0	0	3	24	0	97	"	0	1	3	17	13
50	"	0	0	3	26	4	98	"	0	1	3	20	1
51	"	0	1	0	0	7	99	"	0	1	3	22	4
52	"	0	1	0	2	10	100	"	0	1	3	24	7
53	"	0	1	0	4	13	200	"	0	3	3	21	0
54	"	0	1	0	7	1	300	"	0	5	3	17	0
55	"	0	1	0	9	4	400	"	0	7	3	14	0
56	"	0	1	0	11	7	500	"	0	9	3	10	0
57	"	0	1	0	13	11	600	"	0	11	3	7	0
58	"	0	1	0	15	14	700	"	0	13	3	3	0
59	"	0	1	0	18	1	800	"	0	15	3	0	0
60	"	0	1	0	20	4	900	"	0	17	2	24	0
61	"	0	1	0	22	8	1,000	"	0	19	2	21	0
62	"	0	1	0	24	11	2,000	"	1	19	1	15	0
63	"	0	1	0	26	14	3,000	"	2	19	0	6	0
64	"	0	1	1	1	1	4,000	"	3	18	2	26	0
65	"	0	1	1	3	5	5,000	"	4	18	1	19	0
66	"	0	1	1	5	8	6,000	"	5	18	0	12	0
67	"	0	1	1	7	11	7,000	"	6	17	3	4	0
68	"	0	1	1	9	15	8,000	"	7	17	1	21	0
69	"	0	1	1	12	2	9,000	"	8	17	0	14	0
70	"	0	1	1	14	5	10,000	"	9	16	3	6	0

REDUCTION OF ENGLISH INTO PERUVIAN WEIGHT.

Oz.		kilogs.	grms.	Qrs.		kilogs.	grms.
1	=	... 0	... 28	1	=	... 12	... 70
2	"	... 0	... 57	2	"	... 25	... 40
3	"	... 0	... 85	3	"	... 38	... 10
4	"	... 0	... 113	Cwt.		kilogs.	
5	"	... 0	... 142	1	=	... 50	80
6	"	... 0	... 170	2	"	... 101	60
7	"	... 0	... 198	3	"	... 152	40
8	"	... 0	... 227	4	"	... 203	20
9	"	... 0	... 255	5	"	... 254	00
10	"	... 0	... 284	6	"	... 304	80
11	"	... 0	... 312	7	"	... 355	60
12	"	... 0	... 340	8	"	... 406	40
13	"	... 0	... 369	9	"	... 457	20
14	"	... 0	... 397	10	"	... 508	00
15	"	... 0	... 425	11	"	... 558	80
				12	"	... 609	60
Lb.		kilogs.	grms.	13	"	... 660	40
1	=	... 0	... 454	14	"	... 711	20
2	"	... 0	... 907	15	"	... 762	00
3	"	... 1	... 361	16	"	... 812	80
4	"	... 1	... 814	17	"	... 863	60
5	"	... 2	... 268	18	"	... 914	40
6	"	... 2	... 722	19	"	... 965	20
7	"	... 3	... 175	Tons		kilogs.	
8	"	... 3	... 629	1	=	... 1,015	00
9	"	... 4	... 82	2	"	... 2,032	10
10	"	... 4	... 536	3	"	... 3,048	10
11	"	... 4	... 990	4	"	... 4,064	20
12	"	... 5	... 443	5	"	... 5,080	20
13	"	... 5	... 897	6	"	... 6,096	30
14	"	... 6	... 351	7	"	... 7,112	30
15	"	... 6	... 804	8	"	... 8,128	40
16	"	... 7	... 258	9	"	... 9,144	40
17	"	... 7	... 711	10	"	... 10,160	50
18	"	... 8	... 165	11	"	... 11,176	50
19	"	... 8	... 619	12	"	... 12,192	60
20	"	... 9	... 72	13	"	... 13,208	60
21	"	... 9	... 526	14	"	... 14,224	70
22	"	... 9	... 980	15	"	... 15,240	70
23	"	... 10	... 433	16	"	... 16,256	80
24	"	... 10	... 887	17	"	... 17,272	80
25	"	... 11	... 341	18	"	... 18,288	90
26	"	... 11	... 794	19	"	... 19,304	90
27	"	... 12	... 248	20	"	... 20,321	00

REDUCTION OF INCHES INTO CENTIMÈTRES.

Inches.		Yards.	Centim.	Inches.		Yards.	Centim.
1	or	0	= 2½	19	or	0	= 48½
2	"	0	" 5	20	"	0	" 50½
3	"	0	" 7½	21	"	0	" 53½
4	"	0	" 10	22	"	0	" 55½
4½	"	½	" 11½	22½	"	½	" 57
5	"	0	" 12½	23	"	0	" 58½
6	"	0	" 15½	24	"	0	" 61
7	"	0	" 17½	25	"	0	" 63½
8	"	0	" 20½	26	"	0	" 66
9	"	¼	" 23	27	"	¾	" 68½
10	"	0	" 25½	28	"	0	" 71
11	"	0	" 28	29	"	0	" 73½
12	"	0	" 30½	30	"	0	" 76
13	"	0	" 33	31	"	0	" 78½
13½	"	¾	" 34½	31½	"	½	" 80
14	"	0	" 35½	32	"	0	" 81½
15	"	0	" 38	33	"	0	" 83½
16	"	0	" 40½	34	"	0	" 86½
17	"	0	" 43	35	"	0	" 89
18	"	½	" 45½				

REDUCTION OF YARDS INTO MÈTRES.

Yards.		Mètres.Cen.	Yards.		Mètres.Cen.
1	... = ...	0 91½	23	... = ...	21 3
2	... " ...	1 83	24	... " ...	21 95
3	... " ...	2 74	25	... " ...	22 86
4	... " ...	3 66	26	... " ...	23 77
5	... " ...	4 57	27	... " ...	24 69
6	... " ...	5 49	28	... " ...	25 60
7	... " ...	6 40	29	... " ...	26 52
8	... " ...	7 32	30	... " ...	27 43
9	... " ...	8 23	31	... " ...	28 35
10	... " ...	9 14	32	... " ...	29 26
11	... " ...	10 6	33	... " ...	30 17
12	... " ...	10 97	34	... " ...	31 9
13	... " ...	11 89	35	... " ...	32 0
14	... " ...	12 80	36	... " ...	32 92
15	... " ...	13 72	37	... " ...	33 83
16	... " ...	14 63	38	... " ...	34 75
17	... " ...	15 54	39	... " ...	35 66
18	... " ...	16 46	40	... " ...	36 58
19	... " ...	17 37	41	... " ...	37 49
20	... " ...	18 29	42	... " ...	38 40
21	... " ...	19 20	43	... " ...	39 32
22	... " ...	20 12	44	... " ...	40 23

REDUCTION OF YARDS INTO MÈTRES—*continued.*

Yards.		Mètres.Cen.	Yards.		Mètres.Cen.
45 ... = ...	41	15	80 ... = ...	73	15
46 ... " ...	42	6	81 ... " ...	74	6
47 ... " ...	42	98	82 ... " ...	74	98
48 ... " ...	43	89	83 ... " ...	75	89
49 ... " ...	44	80	84 ... " ...	76	81
50 ... " ...	45	72	85 ... " ...	77	72
51 ... " ...	46	63	86 ... " ...	78	64
52 ... " ...	47	55	87 ... " ...	79	55
53 ... " ...	48	46	88 ... " ...	80	47
54 ... " ...	49	38	89 ... " ...	81	38
55 ... " ...	50	29	90 ... " ...	82	29
56 ... " ...	51	21	91 ... " ...	83	21
57 ... " ...	52	12	92 ... " ...	84	12
58 ... " ...	53	3	93 ... " ...	85	4
59 ... " ...	53	95	94 ... " ...	85	95
60 ... " ...	54	86	95 ... " ...	86	87
61 ... " ...	55	78	96 ... " ...	87	78
62 ... " ...	56	69	97 ... " ...	88	69
63 ... " ...	57	61	98 ... " ...	89	61
64 ... " ...	58	52	99 ... " ...	90	52
65 ... " ...	59	43	100 ... " ...	91	44
66 ... " ...	60	35	110 ... " ...	100	58
67 ... " ...	61	26	120 ... " ...	109	72
68 ... " ...	62	18	130 ... " ...	118	87
69 ... " ...	63	9	140 ... " ...	128	1
70 ... " ...	64	0	150 ... " ...	137	16
71 ... " ...	64	92	200 ... " ...	182	88
72 ... " ...	65	84	300 ... " ...	274	32
73 ... " ...	66	75	400 ... " ...	365	75
74 ... " ...	67	66	500 ... " ...	457	19
75 ... " ...	68	58	600 ... " ...	549	63
76 ... " ...	69	49	700 ... " ...	640	7
77 ... " ...	70	41	800 ... " ...	731	55
78 ... " ...	71	32	900 ... " ...	822	13
79 ... " ...	72	24	1,000 ... " ...	914	89

REDUCTION OF MÈTRES INTO YARDS.

Centim.		Ins. or Yds.	Centim.		Ins. or Yds.
5 ... = ...	2	0	55 ... = ...	21 $\frac{5}{8}$	0 $\frac{5}{8}$
10 ... " ...	4	0 $\frac{1}{2}$	60 ... " ...	23 $\frac{1}{2}$	0 $\frac{1}{2}$
15 ... " ...	5 $\frac{7}{8}$	0 $\frac{3}{4}$	65 ... " ...	25 $\frac{5}{8}$	0 $\frac{3}{4}$
20 ... " ...	7 $\frac{7}{8}$	0 $\frac{1}{2}$	70 ... " ...	27 $\frac{1}{2}$	0 $\frac{1}{2}$
25 ... " ...	9 $\frac{3}{4}$	0 $\frac{1}{4}$	75 ... " ...	29 $\frac{1}{2}$	0 $\frac{1}{4}$
30 ... " ...	11 $\frac{3}{4}$	0 $\frac{1}{4}$	80 ... " ...	31 $\frac{1}{2}$	0 $\frac{1}{4}$
35 ... " ...	13 $\frac{3}{4}$	0 $\frac{1}{8}$	85 ... " ...	33 $\frac{1}{2}$	0 $\frac{1}{8}$
40 ... " ...	15 $\frac{3}{4}$	0 $\frac{1}{8}$	90 ... " ...	35 $\frac{1}{2}$	1
45 ... " ...	17 $\frac{3}{4}$	0 $\frac{1}{4}$	95 ... " ...	37 $\frac{1}{2}$	1
50 ... " ...	19 $\frac{3}{8}$	0 $\frac{1}{2}$			

REDUCTION OF MÈTRES INTO YARDS—*continued.*

Mètres.	Yds. Eighths.	Mètres.	Yds. Eighths.
1 ... = ...	1 1	47 ... = ...	51 3
2 ... „ ...	2 1	48 ... „ ...	52 4
3 ... „ ...	3 2	49 ... „ ...	53 5
4 ... „ ...	4 3	50 ... „ ...	54 5
5 ... „ ...	5 4	51 ... „ ...	55 6
6 ... „ ...	6 4	52 ... „ ...	56 7
7 ... „ ...	7 5	53 ... „ ...	58 0
8 ... „ ...	8 6	54 ... „ ...	59 0
9 ... „ ...	9 7	55 ... „ ...	60 1
10 ... „ ...	11 0	56 ... „ ...	61 2
11 ... „ ...	12 0	57 ... „ ...	62 3
12 ... „ ...	13 1	58 ... „ ...	63 3
13 ... „ ...	14 2	59 ... „ ...	64 4
14 ... „ ...	15 3	60 ... „ ...	65 5
15 ... „ ...	16 3	61 ... „ ...	66 6
16 ... „ ...	17 4	62 ... „ ...	67 6
17 ... „ ...	18 5	63 ... „ ...	68 7
18 ... „ ...	19 5	64 ... „ ...	70 0
19 ... „ ...	20 6	65 ... „ ...	71 1
20 ... „ ...	21 7	66 ... „ ...	72 1
21 ... „ ...	23 0	67 ... „ ...	73 2
22 ... „ ...	24 0	68 ... „ ...	74 3
23 ... „ ...	25 1	69 ... „ ...	75 4
24 ... „ ...	26 2	70 ... „ ...	76 4
25 ... „ ...	27 3	71 ... „ ...	77 5
26 ... „ ...	28 3	72 ... „ ...	78 6
27 ... „ ...	29 4	73 ... „ ...	79 7
28 ... „ ...	30 5	74 ... „ ...	80 7
29 ... „ ...	31 6	75 ... „ ...	82 0
30 ... „ ...	32 6	76 ... „ ...	83 1
31 ... „ ...	33 7	77 ... „ ...	84 2
32 ... „ ...	35 0	78 ... „ ...	85 2
33 ... „ ...	36 1	79 ... „ ...	86 3
34 ... „ ...	37 1	80 ... „ ...	87 4
35 ... „ ...	38 2	81 ... „ ...	88 5
36 ... „ ...	39 3	82 ... „ ...	89 5
37 ... „ ...	40 4	83 ... „ ...	90 6
38 ... „ ...	41 4	84 ... „ ...	91 7
39 ... „ ...	42 5	85 ... „ ...	93 0
40 ... „ ...	43 6	86 ... „ ...	94 0
41 ... „ ...	44 7	87 ... „ ...	95 1
42 ... „ ...	45 7	88 ... „ ...	96 2
43 ... „ ...	47 7	89 ... „ ...	97 3
44 ... „ ...	48 1	90 ... „ ...	98 3
45 ... „ ...	49 2	91 ... „ ...	99 4
46 ... „ ...	50 2	92 ... „ ...	100 5

REDUCTION OF MÈTRES INTO YARDS—*continued*.

Mètres.	Yds. Eighthths.	Mètres.	Yds. Eighthths.
93 ... = ...	101 6	230 ... = ...	251 6
94 ... „ ...	102 6	240 ... „ ...	262 4
95 ... „ ...	103 7	250 ... „ ...	273 4
96 ... „ ...	105 0	260 ... „ ...	284 3
97 ... „ ...	106 1	270 ... „ ...	295 3
98 ... „ ...	107 1	280 ... „ ...	306 2
99 ... „ ...	108 2	290 ... „ ...	317 2
100 ... „ ...	109 3	300 ... „ ...	328 0
110 ... „ ...	120 2	400 ... „ ...	437 3
120 ... „ ...	131 2	500 ... „ ...	646 6
130 ... „ ...	142 2	600 ... „ ...	656 1
140 ... „ ...	153 1	700 ... „ ...	765 4
150 ... „ ...	164 1	800 ... „ ...	874 7
160 ... „ ...	175 0	900 ... „ ...	984 2
170 ... „ ...	186 0	1,000 ... „ ...	1,093 5
180 ... „ ...	196 7	2,000 ... „ ...	2,187 2
190 ... „ ...	207 7	3,000 ... „ ...	3,280 7
200 ... „ ...	218 6	4,000 ... „ ...	4,374 4
210 ... „ ...	229 6	5,000 ... „ ...	5,468 1
220 ... „ ...	240 5	10,000 ... „ ...	10,936 2

TARIFF OF PASSAGE FARES FROM ENGLAND TO PERU.
TO THE PACIFIC COAST OF PERU.

The present 3rd class fares to Callao are :—

By the Pacific Steam Navigation Company from Liverpool; departures twice a month <i>viâ</i> Straits of Magellan	£25 0 0
By the Royal Mail Company's steamers from Southampton; departures twice a month <i>viâ</i> Panama, 2nd class	£29 15 0
The steamers of the West India and Pacific Steamship Company also leave Liverpool every Saturday taking passengers for Peru <i>viâ</i> Panama.	

TO THE EASTERN PROVINCES OF PERU.

Third class fare to Para (at the mouth of the Amazon) by Messrs. A. Booth & Co.'s steamers from Liverpool, but less according to number of passengers ...	£12 10 0
By the Amazon Steam Navigation Company's steamers from Para to the Upper Amazons to Loreto... By arrangement.	

For a sound organised scheme of emigration the Government would no doubt place two or three of their steamers at the disposal of a society.

The long and costly journey *viâ* Straits of Magellan and *viâ* Panama has CHECKED emigration from Europe to Peru,

but as soon as the Panama Canal is opened that drawback will be removed and persons will be able to take passages to Callao as cheap as to Buenos Ayres (£10).

TARIFF OF FREIGHTS AND PASSAGES

Per Royal Mail Company's Steamers from Southampton, leaving that port bi-monthly.

Ports.	From London and Manchester.		From other places.	
	Fine Goods.	Coarse Goods.	Fine Goods.	Coarse Goods.
Callao.....	70/-	65/-	80/-	75/-
Paita, Pimentel, Eten, Pacasmayo, Salaverry, Tumbes, Santa, Chimbote, Samanco, Casma, Huarmey, Supe, Huacho, Chancay, Ancon	90/-	90/-	100/-	100/-
Cerro Azul, Tambo de Morro, Pisco, Quilca, Lomas, Chala Mollendo, Arica, Ilo, Pisagua, Iquique	120/-	120/-	130/-	130/-

Per ton of 40 feet measurement. All with 5 per cent. primage.

	1st Class.	2nd Class.	Servants.
Passages to Callao.....	£63 0 0	£29 15 0	£40 13 4
„ to Paita	56 0 0	27 10 0	36 0 0

RATES OF HOMEWARD FREIGHT.

Cocoa from Callao	£10 0 0	per ton and 5 per cent. primage.
Cotton, in pressed bales,		
Paita.....	6 0 0	„ and 5 per cent. „
Bark from Paita	9 10 0	„ and 5 per cent. „
„ „ Mollendo	8 10 0	„ and 5 per cent. „
„ „ Arica	7 0 0	„ and 5 per cent. „
Ore „ Callao	4 0 0	„
Hides, salted or raw	6 0 0	„
„ dry	6 0 0	„
Wool, pressed.....	8 0 0	„
Tobacco in serons	7 0 0	„
General merchandise	6 0 0	„



THE PORT OF MANAOIS,

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COST OF VOYAGE UP THE AMAZON.

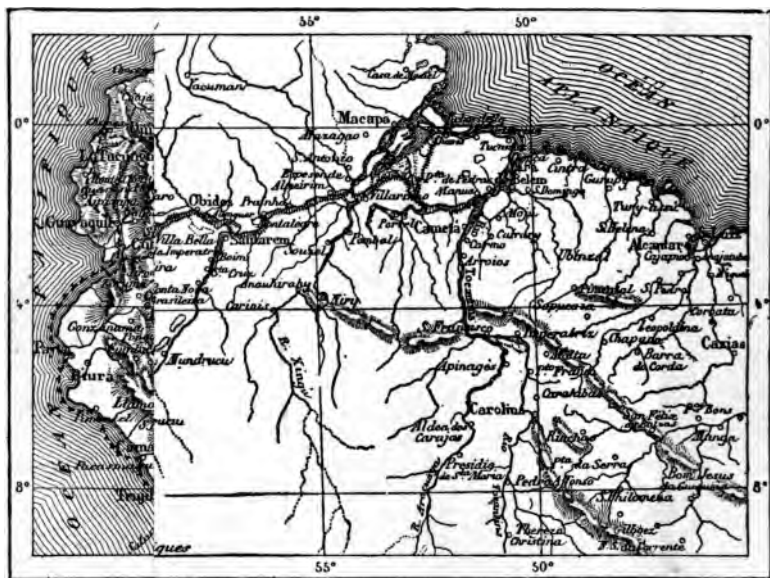
The passage from England to Para from Liverpool is £12 10s. third class, and £25 first class.

The following is Professor Orton's description of a voyage up the Amazon :—"At the Hotel Commerceo, at Para, you pay 10s. a day for first-class accommodation. Steamers leave Para for Mañáos the 2nd, 9th, and 18th of each month. Suppose that on the 18th you board one of the Brazilian steamers for Mañáos, fare fifty-four dols., time six days. In this voyage of 1,000 miles, you will discern the marvellous wealth of tropical vegetation. The principal points of interest are Bréves, the enchanting channel of Tajupurá, the table-hills of Almeirim, the romantic port of Alegre, stately Santarem, picturesque Obidos, and enterprising Serpa. Do not fail to have a row on the River Rio Negro, and to visit the cascade in the forests. Sept. 12 you will embark on the *Icamiaba*, and enjoy another charming voyage of 1,000 miles, fare forty-five dols., time six or eight days. The most important places, on the middle Amazon, are Ega, Foente Boa, and San Paulo. Tabatinga, the termination of the voyage, is the frontier fortress of Brazil. There you exchange steamers, taking the Peruvian steamer *Moroña* or *Pastassa*, which will leave Tabatingo for Yurrimaguas, on the Huallaga, Sept. 21st, fare 70 dols. = £14. The steamer runs only in the day-time, and stops at numerous points, so that you have a fine opportunity of studying the wild exuberance of Nature on the Upper Marañon, where the forest is more magnificent than lower down. The places of chief interest are, Mancalacta, Iquitos, Nanta, and San Regis. At Iquitos, an enterprising village of 2,000 souls, the steamer stops six days. Here are the Government ironworks of Peru, carried on by English mechanics. You will reach Yurrimaguas Oct. 5th.

"From Yurrimaguas you may follow Herndon's track, if you choose, taking canoe up the Huallaga to Tingo Maria, and thence by mule to Lima. But I advise an easier route :—hire a boat and three Indians (twenty dols.) for Balsa Puerto, time five days. Thence foot it four days to

Moyobamba. Moyobamba is a city of nearly 10,000 people, who are busy making hats. You will wish to enjoy the genial climate, and the novelty of this unfrequented spot for at least a week. The price of a mule from Moyobamba to Chachapoyas is eight or ten dols., time six days. To insure a shelter at Chachapoyas, the traveller should bring with him a letter from the Peruvian Minister in London. From Chachapoyas to Leimabamba is a good road, time two days, four dols. fifty cents for beast; sleep at Tingo. From Leimabamba to Balsas, two days, stopping at Huáncó; four to five dols. per beast. Thence it is but half-a-day's ride to the terminus of the Pacasmayo Railway. From Pacasmayo a weekly steamer runs to Callao, a two or three days' journey, passing by famous Trujillo and within sight and smell of the guano-bearing Guarapi Islands; fare, twenty-three dols. The best hotel in Lima is the Mauray; for rooms from fifty cents to two dols. fifty cents per day; board and lodging from three to four dols. Steamers leave Callao to San Francisco, 253 dols.; to New York, viâ Panama, 197 to 214 dols. The whole journey does not exceed 800 dols.; time five months."

An occasional steamer leaves Para for San Antonio, on the Madeira, 434 leagues, time nine days. A monthly steamer leaves Mañaos for San Antonio on the 27th; fare, fifty dols.; thence by canoe to Trinidad, 185 leagues, sixty-two days. From Trinidad to Santa Cruz by canoe, 190 leagues; Santa Cruz to Cochabamba by beast, 119 leagues; Cochabamba to La Paz, by beast, 80 leagues; La Paz to Puno, by beast and steamer, fifty leagues; Puno to Mollendo, by railway, 340 miles. A steamer leaves Mañaos for San Isabel on the Rio Negro the first of every month. Steamers for the Pichis and Juruá leave on the 11th and 20th; fare to the terminus, sixty dols. From Moyobamba to Tarapota, by mule, three to five days; fare, five to ten dols.; Tarapota to Chasuta, one day, one dol.; Chasuta by canoe to Yurrimaguas, two days and one night, with five Indians, four dols. each and food, and ten dols. for canoe. In Moyobamba, Chachapoyas, and Cajamarca, the only hotels are restaurants, kept by Chinamen.



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CONCLUSION.

GENERAL CONSIDERATIONS.

FROM the preceding chapters we may draw the following conclusions :—

First. That Peru, by its great variety of vegetable productions and its illimitable resources in the precious metals, stands unsurpassed by any nation.

Second. That it is a country highly favourable for European immigration, as, by reason of its physical position, and the so-called Humboldt current flowing from the Antarctic regions, it enjoys a much lower temperature compared with other countries in the same latitude. The climate generally is a genial one, varying from that of the south of England to that of the south of Italy. On the Andes there are places not to be surpassed in the world for the relief of bronchial and pulmonary complaints.

Third. That it is unique and excels other countries in many rare and choice products—such as india-rubber, Peruvian bark, coca, a drug which has lately been brought into use by medical science ; alpaca and vicuña wools, &c. The country contains, from one extremity to the other, a boundless supply of gold, silver, coal, and other minerals.

Fourth. That it produces corn, fruits, and vegetables in abundance ; and, with regard to the potato, it is gratifying to find that blight does not attack it, as in other countries.

Fifth. That extensive tracts of land are granted free to all colonists on arrival in Peru, who are secured in their property equally with that of natural-born subjects, and are received in the country with welcome.

A country outside the present flow of emigration, but awaiting the accomplishment of the grand work which Providence has placed in the mind of the immortal genius, M. de Lesseps, to carry out for the world's benefit, Peru dreams a dream, and anticipates her destiny ; a dream of welcoming multitudes of an active and industrious race of people ; a dream of her uncultivated lands returning abundant harvests, and bleating with numerous herds and flocks, her mountains pouring out their precious treasures which are so bountifully stored in them ; and throughout the length and breadth of the land the light of peace and prosperity shining, never to be extinguished.

When we consider that Peru contains 500,000 square miles, or nearly 320 millions of acres, upon which at present there are only two and-a-half millions of people, what a glorious prospect lies before the colonist ! Here there is abundant scope for the exercise of both his energies and capital, sufficient to keep millions of people in active employment for many generations.

APPENDIX.

THE GOLD MINES OF PERU.¹

PRODIGAL Nature, which has heaped upon Peru so many riches, has not been less generous in endowing this privileged country with numerous mines, or washings, of the most precious metal—gold. There is no region in Peru which does not offer some gold deposit; the hillocks which form small chains in the flat region of the coast, the deep valleys of the Sierra, the elevated and rugged Cordillera, the virgin forests of the Montaña; in short, all afford mines or washings of gold. There are, of course, places where the quantity of gold contained in the auriferous earths is altogether too small to pay the expenses of extraction, but there are many places where the mines and washings return large profits.

This wealth of gold is confirmed by the ancient historians in treating of the ransom of the Inca Atahualpa, on which occasion the conquerors were struck with amazement at seeing the enormous quantity of manufactured articles of gold in the country.

Under the Spanish sovereignty,—if we may judge from the numerous surface mines, caves, ruins of houses, mills and quimbales for crushing the auriferous ores,—gold mining was very active, but the absence of any data respecting its production is very remarkable. At the present time the working of gold mines in Peru is very much restricted, only being carried on in a very few places, and on a very small scale. It is truly surprising that a region so rich in gold should hardly figure among the countries producing this precious metal. Is it that the gold mines of Peru are exhausted? Assuredly not! since the rivers Huari-huari and Inambari in the provinces of Sandia and Carabaya, the river Marañon in Chuquibamba, Uco, Balzas, the river Tabluchaca at the foot of the town of Pallasca, and many others, are continually bringing down in their sands numerous particles of gold. From whence do these rivers derive the gold? It is unquestionable that they derive it from the cerros² and deposits of auriferous earths through which the rivers run.

It may be asked,—What is the cause of this decadence of the gold industry? In my opinion, there are numerous causes to account for this depression. The principal are :—(1) The want of association.

¹ By Señor A. Raimondi, translated from the "Anales de Construcciones civiles y de Minas del Perú," vol vi. Published by the School of Engineers. Lima, 1887.

² A hill.

the native state with pyrites or sulphide of iron, or accompanied by other metallic sulphides more or less argentiferous, such as panabas,¹ bournonita,² jamesonita,³ galena, &c. Gold in the Sierra region occurs not only in veins or fissures, but also as scales or grains in ancient and modern alluvials, constituting, in the former the auriferous deposits locally known as rebosaderos and aventaderos, in the latter the lavaderos (washings) which are almost unknown in the coast region.

In the Eastern Cordillera and in the Montaña region gold is usually found in quartz veins, interspersed with talcose and argillaceous slates. The quartz which accompanies gold in this region is usually white, and at times it contains spots of oxide of iron. In this case it is never found in such abundance as in the auriferous minerals of the coast. Mispikel or arsenical pyrites, in small quantities, is sometimes found in auriferous quartz in this region, but principally in that of the province of Sandia. There are large deposits of auriferous earth in this part of Peru, and it is from this place that the largest nuggets of gold have been obtained. In order to give some idea of the dissemination of gold in Peru, we will briefly review all the places in the Republic where, according to my knowledge, gold has been found, following the Departments in geographical order from north to south.

Department of Loreto.—In this Department there are many gold washings in the province of the Alto Amazonas, between the celebrated Pongo of Manseriche and the mouth of the river Huallaga. The principal washings are the Chaupirumi, Pucayaco, Puruaga, Calentura, Achual, Limon Nitagua, &c. These have been worked for two centuries, but were temporarily abandoned in consequence of the continued assaults made by the savages inhabiting that region. In the year 1857, they destroyed the neighbouring villages of Barranca and San Antonio. In the year 1867, Captain D. M. A. Vargas, in his exploring voyage by steamer on the rivers of Iquitos and Marañon, visited these washings, and at a place called Huaslica observed the operation of gold washing practised by the Indian, and was astonished at the richness of those regions. At the present time there are several persons who derive considerable profit from these gold workings.

Gold Washings on the banks of the River Napo.—The important river Napo, which takes its rise in the Republic of Ecuador, brings down in its sands a good deal of gold in grains and very fine flakes, which the Indians extract by means of troughs. Osculati, who descended that beautiful river in the year 1846, says that the Indians pay their tribute to the Government of Ecuador by means of the gold which they remove from the sand and brought down by the river, filling with it some small canes which hold a fixed measure of the precious metal, and if they have collected more gold than is necessary to pay their contribution, they fling the surplus into the river.

The Department of the Amazonas.—The principal place where gold is met with in the Amazonas Department is the district of St. Thomas,

- ¹ sulphide of copper, antimony, and arsenic.
- ² sulphide of lead, copper, and antimony with silver.
- ³ sulphide of antimony and lead with silver.

situated in the province of Luya. The mines are 2 leagues from the town of St. Thomas, and 15 leagues south of the city of Chachapoyas. The auriferous cerros are the San José and the Chururco, the principal vein being known as the Chururco, which is 800 mètres long, and 3 to 24 centimètres broad. This vein is known as the Reo, where it crosses the Reo Quebrada, and in the other range it is known as the Culquinchar. There is another vein known as the Horabuena, which is 30 to 50 centimètres wide. These veins run through a formation of talcose and micaceous slate, gold being found in a quartz bed, accompanied with oxide of iron and pyrites in variable proportion. The quantity of gold varies from $\frac{1}{2}$ oz. to 4 oz. per ton (14.37 grms. to 115.00 grms. per metric ton). In this locality there are several kinds of gold ore, each having a particular name.

There are four principal varieties:—(1) Nusco, (2) Panal de rosa, (3) Higado, (4) Bronce.

The first, the Nusco, is the most esteemed, on account of its being the richest and the most easy to work. It has a darkish colour, and consists of a heterogeneous mass of oxides of iron and manganese, with talcose slate and quartz. This variety crumbles in the fingers, the particles of gold being visible.

The second, the Panal de rosa, is composed of quartz, more or less full of cavities. Gold is also visible, but this ore is not so much appreciated as the former, being more difficult to work.

The third variety, the Higado, is an oxide of iron, which sometimes accompanies the Nusco or the Panal de rosa, and is found in small isolated masses. This variety has rarely any visible particles of gold, but yields it in a state of minute grains, which makes it imperceptible to the eye.

The fourth, the Bronce, is a sulphide of iron, which also yields gold, but it is necessary to calcine the ore to extract the metal.

Previous to 1880, the extraction of gold in this locality was conducted in the most primitive manner and only on a small scale, by means of quimbaletes or mortars, in which the ore was ground, amalgamation being carried on at the same time; it took a whole day to refine a single quintal of ore. In the same year D. A. Wertheman organised in Chachapoyas a small company for working the gold mines of St. Thomas, and constructed a machine to mill the ore, and worked the mine. Unfortunately, after having extracted a little of the precious ore, proving in a practical manner that these mines could be worked with profit, the unfortunate war with Chili interrupted the works, and the want of labourers, the difficulty of communication, and obstacles of all kinds, made it impossible to continue the operations.

The Washings of Patahuachana.—In the Arizon Department there is a gold washing at a place called Patahuachan situated at the mouth of the River Nieva, in the Marañon; but it is not worked, on account of the remoteness of the place, and its being inhabited by the Aguarunas savages. This washing was visited in 1890 by an expedition headed by the Bishop Ruiz, with the object of opening road between Chachapoyas and the Marañon.

Auriferous Sands in the Marañon near Balsas.—At the point where

the Marañon is crossed, on the way to Cajamarca and Chachapoyas, is situated the town of Balsas, and close by is the Honda Quebrada, at the entrance to which the sands on the banks of the Marañon contain a fine quality gold.

The Hualcarumi Washing.—The Department of Piura has a gold washing in the Quebrada of Hualcarumi, 3 leagues north of the town of Ayabaca, the capital of the province of the same name. The gold is found in an alluvial earth, which rests on the crystalline and porphyritic rocks. According to Professor Olacoea, who has given a description of this auriferous deposit, the gold is in a state of fine powder, the grains varying to the size of a pea, and by a test that he made by washing a certain quantity of earth, he obtained gold to the amount of 1·87 grms. per metrical ton.

Gold Mine in the District of Frias.—In addition to the gold washing at Hualcarumi, the Department has a gold mine situated between the town of Frias and the hacienda of Yanango, in the Province of Ayabaca. The gold is found in the quartz forming a vein in the syenitic rock. This mine, it appears, has been abandoned on account of its small ley of gold, which, according to samples assayed, does not average one ounce per cajon (60 quintals).

Washing of Gold in the Province of Jaen.—In the northern part of the province of Jaen, belonging to the Department of Cajamarca, and almost on the borders of Peru and the Republic of Ecuador, is situated the town of San Ignacio; a gold washing is located about half-a-league from the town. This auriferous deposit is found near the hacienda of Tomaqui, but it cannot be worked on a large scale on account of the scarcity of water. For several years the sub-Prefect of the Province of Jaen, Señor De José Maria Villanueva, worked this washing, and constructed a small reservoir which filled during the night, using the whole of the next day for separating the gold.

Auriferous Sand in the River Chinchipe.—About 2 leagues N.E. of the town of San Ignacio is the river Chinchipe, the source of which is in the Republic of Ecuador. In the bed of this river gold is found, which could be extracted with advantage were it not for the distance from Cajamarca (70 leagues), the want of necessities, and bad roads.

The Gold Mines of Asuncion.—About two leagues S.W. of the town of Asuncion in the province of Cajamarca, and about nine leagues from the latter town, are situated the gold mines of Capan, in a metamorphic sand hill. The gold is found in the quartz with oxide of iron, iron pyrites, copper pyrites, and magnetic iron; and also in an earthy ore composed of oxide of iron and copper ore called paco. The pyrites which I have had occasion to analyse contain from 1 to 2½ oz. of gold per cajon (10·4 grms. to 26 grms. per metrical ton), whilst the paco contains varying amounts up to 4 oz. per cajon (41·6 grms. per metrical ton). The mines are badly worked, the excavations only being made where the ore is good. About one league from the Capan mines is the Cerro Colladar, and in Chirinpata several mines are extensively worked, with large and commodious tunnels, and many wells with veins of paco ore, which alternate with laminated carbonate of lime and pyrites. In the valley

at the foot of this cerro there is to be found, at a place called Sapú, the remains of a machine where the ores of Chirinpata were worked; there is also observed in various places the primitive quimbaletes, or machines, which are still used in certain parts of Peru. The principal mines are Chirinpata, La Colorada, El Chino, &c., and if we may judge by the internal workings, these mines must have yielded a large quantity of gold ore. Unfortunately the ores which remain are very poor; lately, having had occasion to analyse various samples of paco, the result yielded on an average only 12 adarmes ($\frac{1}{2}$ oz.) of gold per cajon of 60 quintals (3 tons), which corresponds to 6.46 grms. per metrical ton. The carbonate of lime containing specks of pyrites yielded hardly any traces of gold. In the upper part of the cerro a vein of blende with iron has been found.

The Gold Mines of Carachugo.—Almost on the summit of the Cordilleras, between Cajamarca and Yanacancha, there are several deposits of desmontes¹, and some mines which were worked by the ancient Indians, in the interior of which various stone implements have been found, which were used in working the auriferous ore. These mines, now abandoned, are known as the Carachugo, and have been worked in very porous quartz, presenting the appearance of scoria. The surface mines are very large, but badly worked.

Cerro del Toro. Department of La Libertad.—About half a league west of the town of Huamachuco rises the El Toro hill, composed of sandy soil in almost vertical layers, and between these are several layers of bluish red clay which form a vein or manto. In these clayey layers there is found at times a kind of talcose clay having the appearance of ashes, containing an appreciable quantity of gold. This manto, known as El Carmen and El Rosario, runs S.S.W. to N.N.E. between layers of whitish sand, sloping towards the cerro (S.E.E.) at an angle of 80°. The surface of this manto is 1 foot wide, but below it spreads out so that at a certain depth it is more than 2 metres wide. This manto has been worked for a considerable length of time, and it had, when I visited this place, a run of 124 metres. About 50 metres further on, Señor Liberato Jara, commenced a shaft, cutting the manto transversely, and worked over 40 metres. Don Manuel Lavado continued the work for a further 25 metres, and lastly, Don Juan Lopez Reyna finished it, having cut the manto at the 3 metres. The direction of this shaft is from N.W. to S.E. Señor Reyna worked another pit, to which he gave the name of San Francisco de California.

Gold Mines of the Province of Pataz.—The province of Pataz, principally the southern part, is one of the richest in gold in the whole of Peru, and it might almost be said that the towns of Pataz, Parcoy, Soledad, and Tayabamba, stand upon auriferous deposits. In these towns, especially Parcoy and Tayabamba, when it rains heavily, particles of gold can be seen in the earth of those places, which in the locality is called *astillas*; there have already been found nuggets weighing nearly 1 gm.

¹ Desmontes—A poor silver ore which can only be refined by means of quicksilver.

Gold Mines of the Vicinity of Pataz.—In the vicinity of the town of Pataz there exist many surface mines, from which large quantities of gold have been extracted, but the greater part of them are at present abandoned. The gold is found in quartz, which forms numerous veins in the syenitic rocks and dioritic porphyries, their direction being mostly from north to south. Generally the latter are accompanied with a kind of kaolin,¹ occasionally with small veins of talcose clay, known in the locality as *panizo*. The principal hills in the vicinity of Pataz, where gold mines have been found, are :—

The Cerro of San Francisco, situated about half-a-league south-west of the town of Pataz. The principal mine is the San Francisco, which, according to the data given me, is over 240 mètres, and about 100 mètres deep. At the bottom of the mine a tunnel has been opened to carry off the water. The cerro not only contains gold ores, but also veins of galena and pavonado (argenteriferous grey copper ore).

The Cerro of Jembon, situated N.N.E. of Pataz, on the road leading to Cajamarquilla, is intersected with auriferous veins. The principal is called La Polvadera, and has a mine of the same name about 10 or 12 cuerdas² from the town of Pataz. The vein is of quartz, with panizo; its ores have yielded from 1½ oz. to 50 oz. of gold per cajon (13·88 grms. to 520·83 grms. per metrical ton).

The Cerro of Sarumillo, situated on the side of the river Caruabamba, and about 1 league to the north of Pataz, has a number of veins, which appear to unite at a place called Uquilaya, where a pit has been sunk. The ores of this mine are pacos, and yield some 35 grms. of gold per cajon, or 12·68 grms. per metrical ton. The residue of the refining yields 6 marcs of silver per cajon.

The Gold Mines of Parcoy.—The town of Parcoy, the capital of the province of Pataz, is about 13 leagues from Pataz. In its vicinity there are numerous abandoned gold mines, which lead to the belief that this place must have been in former times a centre of active work.

The auriferous cerros in the vicinity of Parcoy are :—

The Cerro of Mishito, situated N.N.E. of the town. The auriferous mineral is commonly called bronce. This ore is not worked because the ley is said to be small; it is probable they do not extract all the gold it contains, as it is refined without previous calcination. In the Mishito Cerro, a little gold is found in the paco.

The Cerro of Puyhuancito, situated on the other side of the Quebrada de la Soledad, half-a-league N.N.E. of Parcoy. This cerro contains a considerable quantity of gold, but it is found in a very loose soil, which is subject to continual slips, so that the works have been paralysed by the numerous accidents which have occurred.

The Cerro of Chinchil, N.N.W. of the town, has veins of paco, with gold; the ore often contains gold visible to the naked eye. The ore is so friable that it is washed in the trough with quicksilver and the sediment ground in a mill. Behind this cerro is another, called

¹ Kaolin—silicate of alumina.

² A cuadra is 146 yards.

the *Puyhuan Grande*, which may be considered as part of the Cerro Chinchil. The Gullinero and the Cerrito Blanco mines are situated here, which have yielded considerable quantities of gold, the discovery of which has been the foundation of Parcoy.

The Tajo Mine.—Almost at the commencement of the Yacuabamba Valley there is a gold mine worked by open cuttings, on which account it is called El Tajo. This mine is worked like a washing, by causing the auriferous earth to descend by means of water upon a strip of champa (a kind of peat) 50 yards long, with the object of retaining the gold. Every fifteen or twenty days the champa is raised to collect it. This mine has yielded a considerable quantity of gold, but the workers are continually in danger of being buried by its falling in, from which cause it had to be prohibited.

Mina Gigante.—Ascending almost on the summit of the Cerro Mishito, the pit or cutting of Huacrachuco is situated; it is over 300 metres long, and was excavated to drain the rich Gigante Mine, which is situated a little above the place called the Crucero, a point crossed by several veins. This mine, according to documents in the possession of Señor Terrones, has yielded as much as one pound of gold for each basket of 5 arrobas of ore. The Gigante Mine contains gold in pyrites, as in October, 1883, I had occasion to analyse a specimen which contained 9 oz. of gold per cajon (3 oz. per ton).

The Gold Washings of Cajas.—About 2 leagues to the east of the town of Tayabamba, belonging to the province of Pataz, is the river Cajas, the site of the gold washings. About 4 leagues along the right bank of the river there are layers of reddish sand with grains of quartz and layers of very loose ferruginous earth. Gold is found in the latter, principally in the layer of gravel, which is found below, accompanied with some rounded stones of hematite or compact oligist iron, locally known as "matrix del oro," so that the appearance of these stones denotes the presence of gold. In the Cajas washings a nugget was found weighing 5 pounds, and some of 1 to 2 oz. are frequently met with.

On the right bank of the river Cajas, where the gold washings are situated, small streams are frequently met with, which bring down gold in the sand. Amongst these streams there is one worth mentioning, which enters the river Cajas about 3 leagues from Tayabamba, descending from the Pagrasha Cerro, which is of considerable height, and contains many gold mines. The rounded stones which the streams carry down are talcose slate, which leads to the supposition that this cerro is composed of this material.

The Gold Mine near Trujillo.—Recently a gold mine has been discovered about 3 leagues from the port of Salaverry, towards the interior. The gold is found in the quartz, which forms veins in a syenitic rock. The auriferous quartz has a very varied appearance, being more or less compact, porous, and accompanied with a variable quantity of oxide of iron. Occasionally the oxide of iron is so abundant that the ore can be considered a paco.

In the first analysis I made of the ore from this mine, I obtained a ley of gold varying from 1 to 9 oz. per cajon of 60 quintals (104 grms. to 93.6 grms. per metrical ton). Lately much richer ores

have been sent me from the same locality, in which gold is found associated with silver and lead in the following proportion :—

Gold	...	...	...	...	90 grms. per metrical ton.
Silver	...	...	...	...	900 „ „ „ „
Lead	...	...	...	...	30 per cent.

The Zalpo Mines.—These mines are about 18 leagues from Trujillo, in the province of Otuzco, and contain silver and gold. In the richest mine gold is found in the quartz accompanied with kerargira (chloride of silver), limonite, and oxide of manganese. A sample from this mine has yielded on analysis 27·72 marcs of gold and 394·8 marcs of silver per cajon. Another sample, less rich in gold but richer in silver, yielded 24 marcs of gold and 480 of silver per cajon.

In the Zalpo mines, the gold is not only met with in a native state, but also combined with sulphide of lead and silver. Analysis of a sample from the Carabamba mine showed the presence of sulphide of lead rich in silver and gold, accompanied with copper and iron pyrites and blende, giving a result equal to 8·4 marcs of gold and 345·6 of silver.

Gold Mines of the Guadalupito Hacienda.—On the right bank of the river Santa, about 2 leagues from the town, is situated the hacienda of Guadalupito, in the Virú district of the province of Trujillo.

The syenitic hills contain veins of gold bearing quartz, accompanied occasionally with limonite, calcite, and talc. A sample of quartz with limonite and talc gave on analysis a ley of gold of 10 grms. per metrical ton, about 1 oz. per cajon. Another richer sample of quartz with limonite and calcite yielded 40 grms. of gold per metrical ton, or a little less than 4 oz. per cajon.

DEPARTMENT OF ANCACHS.

The department of Ancachs, without being as rich in gold as the department of La Libertad, has also washings and mines.

Washings of Pallasca.—Close to the town of Pallasca, in the province of this name, flows the river Chuquicara, also called the Tablachaca, which separates the Ancachs department from that of La Libertad. This river contains gold-bearing sands, principally in the part between the Tablachaca bridge and its junction with the river Santa. A portion of the inhabitants of Pallasca devote themselves to the extraction of gold from the bed of this river, and on that account they are called Playeros. The gold of the river Chuquicara or Tablachaca is in very small flakes, so that after washing the sand in troughs to concentrate the gold, they separate the metal by means of quicksilver, filtering the amalgam, which they afterwards mould into small balls. A sample of gold from the Pallasca washings gave the following composition :—

Gold	...	...	...	...	...	0·840 per cent.
Silver	...	...	...	...	...	0·084 „
Copper	...	...	...	...	...	0·076 „

The gold from the river Chuquicara is derived from the deposits of auriferous earths on the banks of the river and by the small streams,

principally the Chuygoran. It is a known fact that the sand of the river Chuquicara is richer in gold after its confluence with these streams. Several veins of auriferous ferruginous quartz occur in the talcose slate in the vicinity of the town of Pallasca. A specimen of auriferous quartz from the ravine of Chuygoran gave on analysis 95·8 grms. per metrical ton, equal to 9·2 oz. of gold per cajon.

Gold Mines near the district of Uco.—In the most eastern part of the province of Huari, about 15 leagues N.E. of the town, is situated the district of Uco, with very rich mines and washings. These mines are situated in an elevated cerro, known as San Cristobal de Uchasinga, composed of talcose and gneiss slate, N.N.E. of the town of Uco. Gold is found in the several veins of quartz; the principal veins run S.S.E. and N.N.W., declining to N.N.E. at an angle of 75° to 80°. The quartz is occasionally found crystallised, and containing a little pyrites. The vein is accompanied with a layer of clayey earth, commonly called *caliche*. A specimen from this cerro yielded 37·5 grms. of gold, equal to about 3½ oz. per cajon. There is a particular fact to be noted in this vein, that about 12 metres towards the interior of the cerro, one of the veins disappears, its place being taken by a white feldspathic rock, almost in a state of decomposition, which is locally known as *panizo*; but what is worthy of attention is that with this change, which the miners in the district call *abreria*, the richness of the gold decreases very considerably, the vein becoming almost sterile.

Gold Washings.—In the district of Uco, besides the numerous mines on the hill of San Cristobal de Uchusinga, there are several good washings. They are in the Ninamayhua ravine, on the other side of the cerro of San Cristobal, towards the Marañon. The washings in this ravine, are each known by distinct names, according to the part in which they are located; the principal are:—the Ninamayhua, the Chinchuragra, and the Pucaragra. The auriferous earths are of alluvial origin, being in general of a reddish colour, owing to the presence of a large quantity of oxide of iron, and are formed of débris and rounded stones, such as granite, gneiss, talcose and micaceous slate, quartz, diorite, calcite, and hematite, the latter being found in the lower part of the auriferous deposits, these stones being the true accompaniments of gold. These alluvial earths rest upon a calcareous soil containing ammonites. The Uco washings contain gold in small flakes and grains, but the latter rarely exceed ½ oz. in weight. It is difficult to determine with precision the richness of these washings on account of its being so variable, but the average is about 2 grms. per metrical ton of earth. However, some years ago there was found at one spot over 2½ arrobas (62½ lb.) of gold. The quality of the gold from these washings is of good ley. Analysing a nugget from the Ninamayhua washing, I obtained:—

Gold	...	...	...	...	...	...	0·892
Silver	...	...	...	...	...	...	0·048
Copper	...	...	...	...	...	...	0·060

Gold Mine of Janca.—About 6 leagues from the Culebras ravine, in the province of Santa, is the hacienda of Cusmo; about 3 leagues from Cusmo towards the interior, and about half a league from the

The gold is very argentiiferous, as shown by the analyses of three specimens.

Gold,	41 grms., equal to about	4 oz. per cajon.
Silver,	104 " " "	10 " "

Gold, 78 grms., equal to about 7½ oz. per cajon.
Silver, 63 " " " 6 " "

Gold, 114 grms., equal to about	.....	1·36	marcs per cajon.
Silver, 90 " " "	.....	1·07	" "

In these mines the gold was found in small quantity in pyrites, in oxide of iron, and in ferruginous quartz, but distinguishable. Samples of ore gathered in this place vary very considerably in richness. Eight specimens showed an average of 5 to 59 grms. per metrical ton, equal to about $\frac{1}{4}$ to 5 oz. of gold per cajon.

Gold Mines of Quillo.—Near the town of Casma, N.E. to S.W. by W., is the Quillo Quebrada, through which passes the road leading from Casma to Yungay. Near the town of Quillo is a gold mine, in which the mineral lies on a bed of quartz, somewhat ferruginous, with rose-coloured feldspar and chloritic talc or protogine, the mineral

¹ Cyanosa, sulphate of copper.

element occasionally giving place to an irregular rock, with matrices of yellowish and greenish colours. Some specimens of ores of this mine exhibit gold visible to the naked eye, forming small veins in the quartz with oxide of iron. The vein is about 4 inches wide, and the common ore, which does not exhibit gold visible, yielded on analysis 60 grms. of gold per metrical ton, about $5\frac{3}{4}$ oz. per cajon.

Huancayo Mines.—In the Ambar ravine, near Supé, at a place called Huancayo, about 15 leagues from Huacho, there is an abandoned mine, from which, according to tradition, a considerable quantity of gold has been obtained. This mine appears to have been worked by the Peruvians anterior to the conquest of Peru, as shown by the ancient stone mortars, &c. A specimen of cellular quartz from the vicinity of the mine, indicated a ley of gold equivalent to 16 grms. per metrical ton ($1\frac{1}{2}$ oz. per cajon).

Gold Mines of Huarney.—In the vicinity of the town of Huarney, in the province of Santa, are several surface mines from which gold has been extracted. It is found in the quartz with oxide of iron, forming veins in the syenitic rock. Although it is said that some specimens have been found exhibiting gold to the naked eye, in general the ore is somewhat poor. None of the specimens that I have had occasion to analyse exceeded a ley of 20 grms. of gold per metrical ton, equal to about 2 oz. per cajon.

Gold Mines Pamplona.—These mines, containing gold and lead, are situated in the province of Cajatambo, near the confluence of the principal branch of the river Barranca with the Gorgor.

Ores in the Department of Ancachs, in which Gold is found associated with other Metals.—The gold in this Department, besides being found in a native state, is also found combined with other metals. In the ore of the Recuay district gold is found in a perceptible quantity in the argentiferous galena of the Santa Rosa mine; in the argentiferous galena with pyrites and bournonita of the Bulona mine; in the pyrites, phillipsita, and bournonita of the Salteada mine; in the stibnite¹ and blende of the Mercedes mine; in the argentiferous blende and pyrites of the San Augustin mine; in the argentiferous jamesonite of the San Bartolomew mine; in the argentiferous blende, galena and bournonita of the Llacchu mine; and in the argirosa² with galena and anglesite of the Huerta and Toma mines.

In the ores of the Macato district of the Huaylas province gold is met with, in the argentiferous limonite and in the argentiferous blende of the San Lazaro mine. In the various ores of the Aija district of the province of Huaray gold is found in the proportion of 2 to 3 oz. per cajon, or 20·8 grms. to 31·2 grms. per metrical ton; such as the jamesonite with anglesite,³ and the argentiferous galena of the Huayhuash Cerro; pyrites with mispickel⁴ and covellina of the Huancarama; and panabas with mispickel of the Yanahuanca mine. Among the ores of the province of Cajatambo which contain gold, should be mentioned the native silver with galena of the Rosario mine in Auque-

¹ Sulphide of antimony.

² Sulphide of silver.

³ Sulphide of lead.

⁴ Sulphide of arsenic and iron.

marca, and the galena with native silver, panabas, and chalkopyrite of the Santa Rosa mine in the same place.

It is very probable that many other ores in the Ancachs Department which have not been tested may contain some per-centage of gold.

DEPARTMENT OF HUÁNUCO.

The Huánuco Department has auriferous washings and veins, the principal being that of Chuquibamba.

Chuquibamba Washing.—The town of Chuquibamba belongs to the Singa district, and is situated on the banks of the Marañon, which divides this small town into two parts, which communicate by means of a bridge. There are numerous cataracts in the river Marañon near Chuquibamba, the river running through talcose slate, the predominating rock.

Chuquibamba has been celebrated in former times for its rich gold washings, one place producing in the last century over 8 arrobas. On both banks of the river many large holes have been excavated. While under the Spanish rule, a Curé of the town of Llata, in company with a corregidor, attempted to deviate the current of the Marañon by constructing a solid wall of calicanto wood, the remains of which still exist, with the object of obtaining large quantities of gold from the river bed. Some years ago a North American, finding gold in the sand, formed a similar project, but he died before putting the enterprise into operation.

Señor Villamel undertook extensive works, and extracted a little gold. Finally, about six years ago Señor D. Benito Arana conceived the idea of extracting gold from the bed of the river near the bridge, where the current is slow. With this object he constructed a large dredger to dredge up the gold, which is supposed to accumulate at this point, the river here being deeper and the current slower.

After having incurred heavy expenses for the transport, &c., it was found the dredger could not act, on account of the great stones which were found at the bottom of the river.

At the present time the Chuquibamba washings are almost abandoned; only a few Indians and people of the district collect gold on a very small scale.

The Rain Washing.—About 4 leagues from Chuquibamba, towards the source of the Marañon and about 1 league from Chavinillo, a town in the province of Dos de Mayo, stands the Rain estancia, on the left bank of the river.

Near this estancia there is an auriferous alluvial earth, which is not worked. A specimen from this place exhibits gold distinctly visible in a kind of conglomerate of limonite débris and talcose slate.

Gold Mines of Boca de Sapo.—In the Tucapa ravine, near the town of Huallanca, in the province of Dos de Mayo, there exists a mine called "Boca de Sapo." The ore is of a yellowish grey colour, formed of quartz, full of cavities like a sponge, and accompanied with oxide of iron. Analyses of a specimen of this ore showed 32 grms. of gold per ton, a little more than 3 oz. per cajon.

Auriferous Earth near Jesus, in the Province of Dos de Mayo.—About a quarter of a league from Jesus, and some 500 yards from the river, there are many hillocks of auriferous earth, which appear to have been formed by the ancient Peruvians, with the object of washing the gold it contained.

Gold Mines in the Vicinity of Huánuco.—In a place called Puelles, not quite one league from the town of Huánuco, and almost in front of the Huayaopampa bridge, there are ancient gold mines, which were much worked. About one league from Huánuco, in the Rinconada of Mamayaco, there are veins of gold formerly worked by Don Juan Estevan Duran.

At Llicua, 1 league from Huánuco, there are extensive veins of auriferous copper ore. Again, about 1 league from Huánuco, in a small ravine, only 2 leagues long, a rich material, formed of talcose slate, crossed with a small vein of quartz of a greasy appearance, entirely concreted with native gold. The specimen in my collection is of rounded form, as if it had been rolled by water; the talcose slate of which it is formed resembles that of the cerros in the small ravine in which it was found. In spite of all the researches made to ascertain its origin, the place from which it is derived is unknown. In Cani and Paucar, about 4 leagues from Huanuco on the road from the Quebrada of Higuera, there are a large number of veins of gold, copper, and silver ores.

Gold Mines in the District of Chinchao Pano.—In the grazing lands of Yanamugui, belonging to Señor Dr. Gregorio Duran, near the Hacienda Callana, in the district of Chinchao, there are found several ancient mines, the ores of which have a ley of gold of 5 oz. per cajon (52 grms. per metrical ton).

On the road from Huánuco to the Montaña of Pozuzo, and between the towns of Chuglla and Muña, is situated the San Domingo Ravine, the sands of which are auriferous. In the ravine of Cutama, the stream, an affluent of the river Chinchao, yields large-sized grains of gold, but in small quantity.

Washings and Veins of Gold in the Ravine of Cayumba.—The river Cayumba is an affluent of the Huallaga. The earths in this ravine are auriferous and of considerable extent. In the lower part, near the mouth of the river, there are good washings, and at the head of the ravine there are rich veins of native gold. There is a tradition that a very rich vein, called "Los tres Alcantarillas," produced a large quantity of gold.

Cerro of San Matia.—In the Montaña of Mayro, near the point of confluence of the rivers Palcazo and Pozuzo, is situated the Cerro de San Matia, respecting which there are traditions as to its being very rich in gold, but at the present time no auriferous ore is found that justifies this fame.

Gold combined with other Minerals.—In the Huánuco Department there are auriferous ores, in which the gold is found combined with different ores. At Verdecocha, near the town of Chaulan, in the district of Higuera, ores are found composed of pyrites, argentiferous panabas, azurite, and malachite, containing 35 grms. of gold per metrical ton (3 to 36 oz. per cajon).

DEPARTMENT OF JUNIN.

The department of Junin is said to be one of the richest in silver ores, but on the other hand it is very poor in gold, this metal being found only in small quantities in the sand of some of the rivers, and in a few veins of quartz and pyrites.

Gold in the Sand of the Rivers.—Almost all the rivers descending the eastern Cordilleras, towards the Montaña, which by their union form the Perené, carry down in their sands a small quantity of gold in minute grains. The auriferous rivers are the Oxabamba, the Paucartambo, the Chanchamayo, the Tulumayo, and the Pangoa; the gold which they bring down is derived from the veins of quartz which cross the great slate and crystalline rock formation of which the Cordillera is constituted, but the quantity of gold in the quartz and river sand is so small that it scarcely repays the expense of extraction.

Gold Mines near Cerro de Pasco.—Two leagues from Cerro de Pasco, at a place called Quinua, several gold mines are found in a neighbouring cerro, and in those of the Chiquirin and the Huamanranca; but the principal mines are found in the Chuquitambo. This elevated cerro is composed of metamorphic sand, the auriferous ore being cubical pyrites, accompanied with a copper ore, containing green stains of carbonate of copper. These pyrites are also found in the argillaceous slate, observed in the same cerro, and have been worked for many years. Its richness in gold is from 3 to 5 oz. per cajon (31 to 52 grms. per metrical ton).

The Gold Mines of Mosca.—In the high hills of Chaucayan, near the small town of Mosca, in the district of Huariaca, province of Pasco, some veins of auriferous quartz are found in a talcose slate formation. The gold of these mines contains silver, which makes its ley a little low.

Gold Mines of Paucamarca.—In the district of Huasahuasi, which forms part of the province of Tarma, the Paucamarca mine is located, with ores of auriferous quartz and earthy limonite.

Gold Mine of Morococha.—Near the mineral hacienda of Morococha, in the Yauli district, province of Tarma, there is a cerro called Nuevo Potosi; at its foot, in a metamorphic sand extending to the banks of the lake, there is a gold mine in a vein of quartz and pyrites. In the last century this mine was worked, as also many others in the neighbourhood, which existed at the beginning of the present century. Situated about a quarter of a league from Morococha, there is a factory for refining the auriferous ores.

Gold in the Argentiferous Ores of the Yauli District.—Native gold is not only found in the various mines in the Yauli district, but also in a more or less quantity in some of the silver mines, viz., the Florencio, the Maria, the Esmeralda, the Union, and the Volcan, the latter being the richest in gold. It is a remarkable fact that gold frequently occurs in argentiferous ores in the Yauli district accompanied with rhodonite.

DEPARTMENT OF LIMA.

Gold Mines in the Lurin Ravine in the vicinity of Lima and in Ancon.—Gold is found in a very small quantity in the chain of hills skirting the coast of Peru at a very short distance from the sea. It is commonly found in quartz, which forms veins in the syenitic and granitic cerros; on the coast of the Department of Lima there are mines and indications of its presence in almost all the ravines.

In the Mala ravine indications of gold are found near Calango. In the Lurin ravine there are gold mines near Manchay and Sienequilla. In the vicinity of Lima there are mines which have been worked; there is a surface mine in the cerro near Las Caleras, another called Las Ramas, and some indications behind the Cerro of Amancaes. In the Cerro San Cristoval, near the town, I collected specimens which on analysis revealed the presence of gold. In the Ancon ravine there are gold ores of low ley, in quartz with oxide of iron and green stains of carbonate and silicate of copper.

Gold Mines in the Cerro Sanú.—Four leagues from the town of Huacho is the celebrated Cerro Sanú, in which some veins of auriferous quartz were discovered in 1851; this caused so much enthusiasm in Lima, that thousands of persons proceeded to this new California, believing that they would collect gold in handfull. If it is true that this cerro contains gold, it is found in small quantity, and not easy to obtain on account of the expense of extraction and refining; so that the would-be miners, after passing two or three days of great privation, returned with their tools and barrows without being able to fill the sacks they had brought with the coveted gold. This disappointment caused this celebrated cerro to be forgotten, and in a short time the mines were completely abandoned. Putting aside the exaggerated ideas formed by those who have no knowledge of what a mine is, and of the manner in which the gold occurs in nature, the Sanú Cerro really contains gold, but it is found distributed in veins of irregular form, quartz being found at times which contains particles of gold visible to the eye, a sample of which I took from the Santa Catalina mine. In some parts of the same vein the quartz is almost wholly sterile, so that it is very difficult to ascertain the true richness of the ore. To form some idea of its richness, I analysed a collection of specimens, and obtained an average ley of 32 grms. per metrical ton, equivalent to about 3 oz. of gold per cajon.

Presence of Gold in Piedras Gordas.—In a place called Piedras Gordas, on the road from Lima to Ancon, there is a cerro where some trial mines have been made, from which specimens of ferruginous quartz, with stains of silicate of copper, and vestiges of gold, have been obtained. A specimen composed, for the most part, of quartz, with cavities giving it the appearance of scoria, and known in the country as "quijo podrido," produced on analysis very distinct vestiges of gold.

Gold Mine of Corimina.—This mine is located in the district Atavillos Altos, in the province of Canta. Its ores are pacos, com-

posed of a metamorphic sand, with scoriaceous ferruginous quartz, containing silver and gold. An average sample gave on analysis a ley of silver equal to six marcs per cajon, and a ley of gold equivalent to 15 grms. per metrical ton (about $1\frac{1}{2}$ oz. per cajon).

Gold Mines of Huayo.—In the Huamantanga district, in the province of Canta, there is a place called Huayo, where there are several mines, formerly worked, but now abandoned. Three samples of ore from these mines tested a short time ago produced the following result :— (1) A sample from the Nuestra Señora del Carmen mine, composed of a reddish yellow, earthy limonite, intermixed with quartz. Ley of gold equivalent to 20 grms. per metrical ton (a little less than 2 oz. per cajon). (2) Another sample from the same mine, composed of crystallised quartz with limonite. The latter, separated from the large quartz crystals, gave the same ley of gold as the former. (3) From the mine of Señor de S. José de Huarmi-runay, formed of pieces of scoriaceous quartz, accompanied with a yellowish red, earthy limonite, gave a ley of gold of 9 grms. per metrical ton (about 14 oz. per cajon).

Gold Mines of the Hacienda Carretera.—There are several surface mines situated in the hacienda in the district of Pativilca, province of Chancay, some of which have been considerably worked, but are now completely abandoned. Gold is found in the quartz, possessing a greasy appearance, owing to the presence of talc. The quartz has small cavities containing oxide of iron and of manganese. A sample analysed some few months ago contained 10 grms. of gold per metrical ton (a little less than 1 oz. per cajon).

DEPARTMENT OF ICA.

Gold Mines of the vicinity of Ica.—About three leagues from the town of Ica, several gold mines are met with, from which some specimens were obtained and sent to me five years ago. These specimens showed minute particles of gold visible. The ores are somewhat varied, being found principally combined with oligist iron, with a little hornblende of radiated structure and small green stains of silicate of copper. Others are formed of a complicated mixture, with a little limonite. This ore is interesting from a geological point of view, on account of the association of oligist iron with gold and anfibol, which explains how gold is found in deposits of coloured earth, arising from the decomposition of the rocks containing hematite.

Gold associated with Copper Ores.—In the vicinity of Ica there exist many copper mines, viz., the Canza, the Tingue, and the Yauca, which produce very variable kinds of ores, comprising—cuprita (protoxide of copper), chalcosina (prosulphide of copper), covellina (sulphide of copper), chalcopirita (sulphide of copper and iron), filipsita (sulphide of copper and iron accompanied with carbonate of lime), atacamite (oxychloride of copper), malachita (carbonate of copper), azurita (sulphide of copper and iron), cuprocalcita (carbonate of protoxide of copper and lime), crisocola (silicate of copper), limonite (peroxide of iron hydrated), &c. These ores are frequently accompanied with pyrites, quartz, calcite, yeso, &c., but seldom with native ore. Native

ore is found in sandy ores in an irregular manner, the ore appearing only now and then, so that some portions of the copperous ores extracted are entirely sterile of gold.

The Mineral Cerro of Cinco Cruces.—Another instance of the presence of gold, in an accidental manner, in copper ores, is seen in the mineral cerro of Cinco Cruces, situated in the province of Chincha, about eight leagues from Pasco. The ores of this cerro more or less resemble those of Canza and Tingue; occasionally some appear containing native gold, and visible to the naked eye. A fine sample from the Juanita mine in my collection presents the native ore in a very thick limonite, showing chalcosina, accompanied with crystallised atacamita in small prisms, and quartz. Gold is present at the junction of the chalcolite and quartz, forming, as it were, a boundary line between the ores. As I have said before, the presence of gold in these ores is not constant, many samples from the Juanita mine, analysed, did not show any trace of gold; in others it occurred in some quantity.

Gold Mines of Nazca.—Near the town of Nazca there is an auriferous cerro, known as the Cerro Blanco. Gold is found, but not visible to the naked eye, in quartz with oxide of iron. The richness of gold in this ore varies considerably. A collection of various samples averaged 22 grms. of gold per metrical ton (about 2 oz. per cajon). The Professor of Mineralogy in the Peruvian School of Mines recently procured several specimens of the auriferous ores from Nazca and its vicinity.

The specimens obtained from the principal shaft of Cerro Blanco, which is 300 mètres long, were:—

1st. Ferruginous quartz with limonite. This specimen appeared to be formed of some angular stones united by a kind of silicious cement.

2nd and 3rd. A conglomerate of small quartz, more or less ferruginous, with small quartz crystals.

4th. A mixture of quartz, oligist iron and limonite, with small scales of talc.

5th. Oligist iron with quartz and limonite.

6th. A conglomerate composed of angular quartz, coloured exteriorly by oxide of iron.

An analysis of these specimens mixed together exhibited a ley of gold of 10 grms. per metrical ton, a little less than 1 oz. of gold per cajon. This result is almost identical to that obtained a few months previously from the analysis of a collection of ores from the same cerro, sent me by Mr. Elster. However, the ore being scattered in a very irregular way in the quartz veins, it is probable that richer specimens may be obtained. It is certain that the Cerro Blanco veins ought to give a considerable proportion of gold considering the shaft is 300 mètres long, and is extensively worked, together with other secondary ones. Professor Olaechea says there is a tradition that until a recent period an Indian by himself extracted every day from one of these mines an ounce of gold; the mine from which this quantity of gold was obtained is unknown. The specimen of auriferous ore brought by Professor Olaechea from a cerro situated at three leagues south of Nazca, is formed of quartz with oxide of iron and silicate of copper of bluish green colour.

Having examined this specimen with a glass, I was enabled to discover in the silicate of copper some small particles of gold; and an analysis of a portion of the specimen resulted in obtaining a ley of gold equal to 260 grms. per metrical ton, or nearly 25 oz. of gold per cajon. This specimen, compared with the preceding result, is very rich in gold, and it is very probable that the tradition refers to this cerro and not to the Cerro Blanco, as it would only be necessary to refine one load of mineral, which can be easily done in a day, to obtain over an ounce of gold. This deposit is at present worked by the Indians. The specimen brought by Professor Olaechea from the vicinity of the Chillo Hacienda is formed of white quartz with small cavities and coloured exteriorly by oxide of iron. This specimen yielded on analysis only traces of gold, but as the analysis had been made from a single sample, it is possible it was almost sterile; a larger quantity would probably give a larger amount. There are auriferous deposits, but little known, near the hacienda of S. Geronimo, at a short distance of the town of Santa Lucia.

DEPARTMENT OF HUANCAMELICA.

In the Department of Huancavelica, the number of places where gold is found is very few. The following are those in which the presence of gold has been noted.

Cerro de Potocche.—The Cerro de Potocche, called by some Potocchi, is situated near the town of Huancavelica, and has silver, gold, and copper mines. A specimen taken from Los Santos Inocentes mine, composed of paco with a little azurite and malachite, gave on analysis a ley of silver equal to 48 marcs of silver per cajon, and 3 oz. of gold (31.24 grms. per metrical ton).

Julcani Mine.—About 8 leagues from the town of Huancavelica, in the direction of the town of Lircay, is situated the Cerro of Julcani, where there are hundreds of surface mines, many of them being worked by open cuttings in a N.N.W. to S.S.E. direction. The metallic ore forms many small veins, or rather small mantos, which alternate with vertical capas of a dioritic rock, which appears almost stratified. The Julcani mine contains silver ores; but in the central and most elevated portion of the cerro there are gold mines known as De Corihuacta. The gold is found in a porous quartz with stains of oxide of iron, the metal being visible.

The Lircay Mines.—About 1½ league N.E. of Lircay, a town belonging to the province of Angaraes, some mines are found, known as the Viscachas, and also as the Lircay mines, on account of their proximity to the town. These are silver mines, the gold mines are found in the elevated cerro.

Gold Mines of Coris.—In the upper part of the town of Coris, belonging to the province of Tayacaja and near the lake Pumacocha, some gold mines exist, from which very rich specimens have been obtained. A specimen given me by Señor De Felician Urbino presents native gold in an arborescent form and as small threads upon a ferruginous quartz.

DEPARTMENT OF AYACUCHO.

This Department has many gold mines, which were at the commencement of the present century being worked. There are 41 mines of this metal, viz. : 5 in the province of Lucanas, 18 in Parinacochas, 4 in Cangallo, and 14 in Huanta, but at the present time they are almost all abandoned, and no data whatever exists denoting precisely where these mines are located. The better known are those near the town of Chaypi, and in the Cerro of Luicho.

Gold Mines of Chaypi.—In the vicinity of the town of Chaypi, belonging to the district of Pullo, Province of Parinacochas, are found the cerros of Pullo, Chaypi, and Tocota, which have many gold-mines, now almost all abandoned. The gold is found in the quartz, which forms numerous veins in the granitic and syenitic rocks, of which almost all the cerros of that region are composed. The State engineer, Señor Babinski, who visited the place two years ago, says that the veins that he had occasion to examine did not contain gold visible, but yielded from 3 to 5 oz. of gold per cajon (31.34 grms. to 52 grms. per metrical ton); and he believes that among the numerous mines in that locality there may be some that are richer which could be worked with advantage. According to local tradition, there existed in former time over 30 mines, among which the richest were the Muchadero and S. Luis mines, which were worked for over 80 years; the first is about five leagues south of Chaypi, the latter a little distance from this town. About three leagues from Chaypi, towards Pullo, is the Ancocola mine, now completely abandoned, which yielded in former times very rich ores; it is stated that on one occasion from a single basket containing 6 arrobas (150 lb.) of ore, 90 oz. of gold were extracted. Unfortunately the enemy most to be feared in all mines—water—appeared, hindering the working and causing the mines to be abandoned. About two leagues north of Chaypi is the Lambramani mine, which is abandoned on account of being flooded; and about the same distance to the south is the Yamcama mine and the washing of Pisacaya. The Salinas mine, near Tocota, has a vein one metre wide, but is not worked for want of air. In the vicinity of Tocota there are many other abandoned mines, viz., Mollehuaca, Tocota Grande, S. Andres Grande, S. Andres Chico, El Diablo, El Triunfo, Los Torrecillas, Santa Rosa, La Cupitana, El Cobrizo, &c. This region appears to be very auriferous; when it rains, the water running through the ravine near Chaypi, grains and even small nuggets of gold are seen in the sand and stones. At the time Señor Babinski visited this place a miner named Buenaventura Rosellini was working some mines on a small scale, grinding and amalgamating the ore by means of the quimbaleta, and selling the gold extracted to the Chala merchants. It is to be hoped, however, that some day a company will be formed to work these mines on an extensive scale, as the positive existence of gold, the agreeable climate, and the easy methods

of communication which exist with the port of Chala, are favourable conditions for the organisation of a mining company.

The Gold Mines of Otocha.—Near the source of the river Ingenio, which waters a part of the Department of Ica, and in territory belonging to the province of Lucanas, are situated the towns of Otocha and Chavincha, in the vicinity of which are many gold mines, now abandoned. These mines, discovered between 1670 and 1673, produced large quantities of this metal; the fifth part, paid to the King of Spain, was equal to 80,000 dollars annually.

The Gold Mines of the Cerro of Luicho.—About two leagues N.W. of Panza, the ancient capital of the province of Parinacochas, lies the auriferous Cerro of Luicho. In geological structure this cerro is a more or less metamorphic sand, like that of the Huallura deposit, only in the latter the layers of sand are almost vertical, while those in the Cerro of Luicho are almost horizontal. This formation is 800 mètres thick, the summit of the cerro is 3,400 mètres above the level of the sea, and the lower part 2,600 mètres. In this cerro there are many mines which were formerly worked, the principal are (1) La Descubridora, (2) El Choclon, (3) San Agustin, (4) La Piedra Lipe, (5) Santa Barbara, (6) Labor Negro, (7) Boca de Sarate, (8) Copacabana, (9) Tajo de Velido, (10) Boca de Acuña, (11) Tunas-pata. The terrible earthquake in the month of August, 1868, destroyed a greater part of the galleries, so that it is now impossible to reach the walls to examine the nature of the ore, in order to ascertain if it is as rich as Indians describe it. Señor Babinski did not find the ore in the veins still visible as rich as it is reported to be. However, with the help of a microscope, he discovered some specks of gold, which proves that the mines are not completely exhausted. In the Cerro of Luicho, besides these veins there is also an auriferous alluvial. This earth is composed of sand, pebbles, gravel, clays, and very large rounded stones, resting upon the rocks from which it derives its origin. According to the miners of the district, gold is found disseminated in this earth in the form of grains, flakes, and at times nuggets; but Señor Babinski says that, after a careful examination, he had not been able to find either grains or nuggets, but only very thin flakes, and its separation by the puruna would cause considerable difficulty. He also examined the residue, and only met with very slight specks of gold. In the year 1876, a company was formed to work the gold from the alluvial earth, but it was found that the necessary water was very scarce, consequently it was decided to construct an aqueduct to bring a supply from another place. The execution of this work was entrusted to Señor Mabila, who in a short time succeeded in bringing water from a place called Ispanu, situated about 6 leagues off, running in the aqueduct all the water issuing from the hill. This aqueduct, although it is not a perfect construction, fulfils the object for which it is used. After allowing for all sources of loss, there is received at Luicho one cubic foot, or 27 litres, of water per second, a sufficient quantity to wash the soil. The Society sent for a practical miner from California, Señor D. Carlos Hern, who constructed a machine to wash the soil on a large scale. According to data

obtained on the spot by Señor Babinski, the owners calculate to extract 4 adarmes, or $\frac{1}{4}$ oz. for each 6 arrobas of earth, which corresponds to about 94 grms. of gold per metrical ton; but, according to the analysis of several samples he obtained, the richness in gold may be calculated at 10 grms. per metrical ton, about 1 oz. of gold per cajon. Notwithstanding the yield of gold, the sufficient water supply, and the place enjoying a very agreeable climate, the company broke up its works without assigning any cause for doing so, consequently the Luicho remains almost abandoned.

Gold and Silver Mines of Marañ.—About three leagues south of the town of Panza, lies the village of Marañ, and on the other side of the river Lampa there is an abandoned gold and silver mine. The mine is called the Esperanza, and it is situated in a deep hole about 15 mètres above the river. Señor Babinski, who visited this place in 1882, had to make use of ropes and ladders to reach the top of the mine. He says, "the vein is almost perpendicular to the river, and runs from east to west, and has a vein 10 centimètres wide on top, which appears to increase in thickness below. The walls of this vein are porphyritic, and the gangue or matrix is composed of sulphate of baryta and quartz. The mineral is a grey copper ore, which on analysis yielded 12 marcs of silver and 6 oz. of gold per cajon. It contains also a high percentage of copper. This mine was worked prior to 1868, but was abandoned on account of the difficulty of extracting the ore. In the vicinity of this mine there are various other surface mines of very little importance, the working of which is very difficult, from being located in almost inaccessible places."

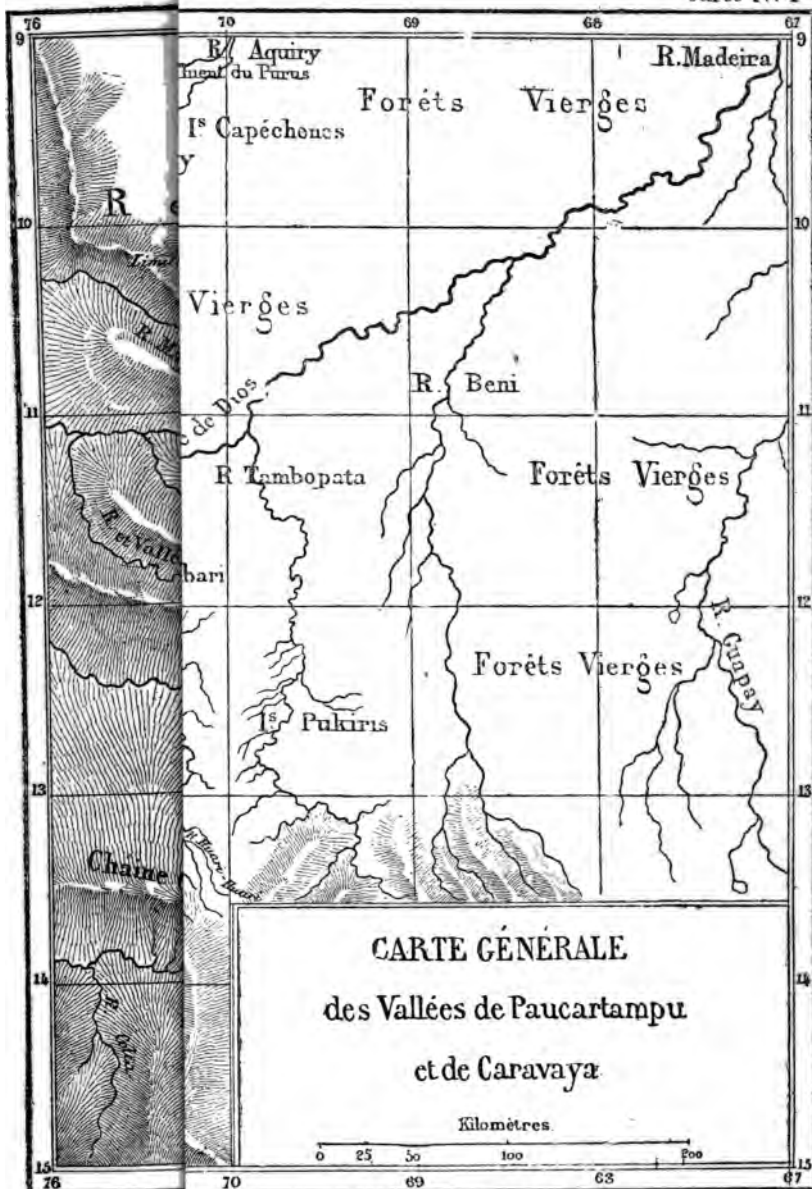
Gold Washings of the Montaña of Huanta.—In various places in the Montaña of Huanta, and in the valley of Simariba and Acon, gold washings are met with, but the superstitious ideas of the inhabitants impede the working of them, as they believe that if the gold is extracted, all their plots of sown land will not yield, and consequently they would be reduced to starvation.

DEPARTMENT OF CUZCO.

In the extensive department of Cuzco the province of Paucartambo is very rich in gold. There is no doubt the ancient Peruvians extracted a considerable quantity from this district.

The part of the province of Paucartambo containing the most gold is the basin of the river Mapacho, from its source near the town of Ocongate to the town of Paucartambo, the capital of the province. The predominating rock in this region is slate, alternating from talcose to micaceous slate, and in some places to a very argillaceous slate, which imperceptibly passes to hard talcose clays, which rest upon the former. Gold is found almost always in the quartz, which varies very much in its appearance, being more or less white and compact, or more or less porous and stained with limonite. This quartz forms many little veins in the slate, which are at times very rich in gold, but are generally not very thick.

Commencing at the source of the river Mapacho, which is also known



1. The first part of the paper is devoted to a review of the literature on the topic.

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as the Ocongate or Paucartambo, according to the districts through which it flows, the following mines are met with :—

Gold Mines of Huiscapata.—The mine of this name is situated on the right margin of the river, about a quarter of a league from the town, in a very pleasant valley. The rock is an argillaceous slate, easily divided. The surface mine is situated at a place where various small veins of quartz cross one another. They are now obstructed, as all the superficial workings have fallen in. The principal vein runs from east to west, and is formed of porous quartz, coloured with oxide of iron. The Huiscapata mine was famous for its large yield of gold to its original owner, Señor D. Evarito Gallareta, who worked it from the surface some eighty years ago. When the mine was at its greatest depth from the surface, there were over ten working passages, and a large quantity of native gold in sight. It became inundated with water, which choked it in a few hours. The owner constructed a drain, with the object of emptying it, but did not connect it with the inundated workings. He commenced another drain, but having no special knowledge of the work required, expended money uselessly, without obtaining the desired result. These tunnels are at present inaccessible, having fallen in. Another tunnel was afterwards opened on the west side of the course of the principal vein, probably with the object of striking the inundated workings, but without any result. Some are of opinion that it is impossible to carry off the water from the mine by means of tunnels, because they believe the inundated workings are below the level of the river. On the bank of the river, at the foot of the mine, are the ruins of the hacienda, where the ores were refined.

Gold Mine of Carhuayo.—Less than 1 league from the town of Ocongate, on the right margin of the river, in a ravine, is the gold mine of Carhuayo, which has recently been discovered, and is, perhaps, the only mine in the province of Paucartambo which is being permanently worked. The auriferous quartz of this mine is very white, somewhat compact, and slightly transparent; it has seldom any traces of oxide of iron, but presents occasionally small stains of sulphate of copper, and small globules of native copper. This quartz does not form a true vein, but a manto, and runs parallel to the stratification of the slate, which is clayey, talcose, and ferruginous, and in some parts has a semi-crystalline structure, from the presence of granite modifying its nature. This auriferous manto is almost horizontal, running S.E. to N.W., and has a variable thickness of 20 to 25 centimètres. In this mine gold is found more abundantly near the upper wall.

Señor Gohring, who visited this mine, says that he found in the cuttings in the vicinity of the auriferous manto many stones garnished with gold. At the time he examined this mine the working was divided into four parts, resembling tunnels, the largest being 24 metres, and the smallest 5; but according to a later communication from the owner, Señor D. Frederico Chacon, the workings have been extended 7·50 metres in length. Two of the workings had gold visible to the naked eye disseminated in the quartz in the form of filaments and grains. The refinery is situated near the mine. The grinding and amalgamation are performed in quimbaletes, which scarcely grind 50 lb. of ore per

day, producing an average maximum of 10 oz. of gold, so that the maximum ley of gold is 12.5 kilog. per metrical ton, equal to 150 marcs per cajon. There are also ores producing a lower ley. The production of the Carhuayo mine in 1872 and 1873, according to the accounts of the Administrators, amounted to 540 oz. of gold.

Other Gold Mines of the Quebrada of Paucartambo.—In the vicinity of Huiscapata, Carhuayo, and Ocongate, there are many mines with veins of auriferous quartz, but they are only a few metres deep; the work cannot be continued on account of the infiltration of water. Continuing along the left bank of the river Paucartambo, about two leagues from Ocongate, near the mouth of the river Ccatcca, on its right bank, stands the Marcopata mill (now in ruins), which belonged to Señor Garmendia, in which the ores of the Ccatcca mine were ground, the mine being three leagues below, on the right side of the river. About half a league below Marcopata is the hacienda Capana, and about half a league further on is situated the aventadores of Pantipata, from which its owner, Dr. José Arambar, extracted much gold. Continuing the road about 146 yards, another gold deposit called Cocha-cocha is reached, where there exist some labourers' huts. Near this place are the haciendas Chichina, Pampacocha, Hualque, and Huatocto, the latter being situated at the mouth of the river Churo.

Following the right bank of the river Paucartambo, about five leagues from the latter place, is the hacienda of Umana, with a small ravine called the Machaypata, celebrated for its rich gold washings, in which many miners have made their fortune. In the hacienda of Umana there are not only washings but also veins of auriferous quartz, which produce a gold of very fine ley, exceeding twenty-three carats. The mines known as Alcumbra have been worked; one owned by Señor D. Francesco Garmendia produced large quantities of gold. D. Mariano Calero is now working another vein with considerable profit. Another vein in the same cerro has been worked by D. Manuel Sarape, yielding a considerable quantity of gold, but became inundated. At the foot of the hill there are other veins, one worked by its owner, Damaso Aparicio, but now abandoned; another called Ichuna, worked by D. M. L. Aparicio; a third called Ormana-Ccata, abandoned by its owner, D. Ramon Ordóñez, two years ago, for want of means. The principal washing, the Lahuisto, was abandoned for want of labourers and funds, notwithstanding its owner, Señor Ordóñez, believed he could extract large quantities of gold. Three leagues south-east of the Paucartambo mine is situated the hacienda of Cusipata, belonging to Señor Dr. Frederico Bornaz, and watered by a stream which flows into the Mapacho. In this ravine there were rich washings, but are now abandoned.

Gold Mines of Chiripiquio.—Leaving the valley of Paucartambo, and ascending (about two leagues) the valley watered by the river Churo, which empties itself into the Mapacho, near the hacienda Huatocto, we arrive at the hacienda of Pichiucha. The Chiripiquio mine, belonging to the district of Ccatcca, in the province of Paucartambo, about four leagues from Huatocto and eight from Pichiucha, is situated at the foot of a small ravine. The mine has



THE RIVER CHUNTAPUNCO, TRIBUTARY OF THE COÑI, VALLEY OF
MARCAPATA. Face page 290.

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been worked for about fifty years by Señor Mariano Alvarez, and it is calculated that it produced, free of expense, 750,000 soles, the ore being ground in a trapiche and eighteen quimbaletes, stationed half a league off, at a place called Huancapuncu. Work was commenced upon a very fine vein of quartz, which became thicker lower down, until it reached ten centimètres thick. This thread is crossed in various directions by another from one to six centimètres thick, formed of compact white quartz, without pyrites, and without gold being visible. The principal thread is in a very hard crystallised slate.

Incacancha Mines.—About two leagues from Chiripuuquo, between the Quiseriuma and Queñuamayo streams, tributaries of the river Churu, rises the rich Cerro Incacancha, on the summit of which are various mines, now abandoned. The rock is a very argillaceous, finely laminated slate, which in various parts appears contorted, and likewise doubled or twisted, and running in all directions. The auriferous quartz, which has penetrated this rock, filling the cracks and cavities, appears in a very irregular form, forming small veins, which run in different directions, narrowing and widening, or forming purses, which have been worked, but the cavities only remain. The mines, which have been abandoned in this cerro, are:—La Descubredora, Lequechuni, Merced, Hatunhuaila, Santa Cruz, Quehuarñiyoc, Archihuanchiyoc, and Hualpa-Huacayñiyoc. These mines were worked at the beginning of the present century, and produced very large quantities of gold. It is calculated that more than 3,000,000 soles in gold have been extracted in a few years from them. In the Incacancha Cerro various channels are noticed which have been used to wash the earth and to discover auriferous veins. A number of wedges, chisels, and small bars of copper have been found which belonged to the ancient Peruvians, indicating that this deposit had been worked prior to the Conquest. As no remains of aqueducts can be observed on the elevated part of the cerro, where the furrows and channels are, it is probable the ancient Peruvians worked the auriferous soil only during the rainy season. Later, when the mines commenced to *broccar*, they washed the earth by means of the water collected in tanks or ponds made near the Merced mine.

Gold Washings of Churo.—Near the hacienda of Churo, on the road from Cateca to Paucartambo, about three leagues from Cateca, there is on both sides of the river an alluvial deposit called Churo, containing reddish auriferous earths, extending from the Incacancha Cerro to the Queñuamayo stream, from which immense quantities of gold have been extracted, and numerous implements belonging to ancient Peruvians. In these alluvial deposits there are numerous recent excavations made by the Indians inhabiting Churo, who discovered in this earth certain capas (stockwerk) of fine argillaceous sand, of a yellow colour, very rich in gold; it was actively worked for about six months, over two quintals of gold being extracted; among this quantity a nugget weighing 12 oz. and 14 adarmes was found. Señor Göhring had portions of earth washed in his presence, and obtained two nuggets equal to 5 oz. per cajon for one, and 12 oz. for the other; the third was very poor.

Gold Washings in the Montaña region of Paucartambo.—The province of Paucartambo has gold ores in the Montaña region. These consist of deposits of earth and auriferous sands, brought down by the rivers. Although the gold is found in many places in this province, the most productive region is north-north east of the town, in the ravine watered by the streams forming the river Pilcopata. These washings were formerly worked by the Indians, but are now nearly abandoned.

The Gold Mines of Cerro Camante.—A few years after the conquest of Peru, the intrepid Spaniards penetrated to the remote valleys of Marcapata, then known under the name of the Andes of Cuchoa, now belonging to the province of Quispicanchi, in the Department of Cuzco. About twenty-five leagues from Marcapata, there is a cerro, or two conical hills, called Camante, where mines were formerly worked by a company until the bursting of a reservoir which completely inundated the workings and caused the mines to be abandoned. An expedition was organised in 1836 to explore this cerro under the command of Don José Marca Pacheco. The result he published in a pamphlet in which he says, among other matters, "Some experimental washings were made, and resulted in producing 8 oz. of gold. There is also a white substance, encharcada, which contains gold in large quantities." In the same valley there are many other places where gold is met with, viz. :—Ccorimayo, Saniaca, the valley of Garote, which stream runs past the foot of the Camante Cerro, the Yanamayo which passes near the Basiri, situated in front of Camante on the other side of the river, and the Choquellusca.

Gold Mine in the Province of Chumbivilcas.—In the Cerro of Condoray in the district of Colquamarca, belonging to the province of Chumbivilcas, there is a gold washing, which formerly produced 2 arrobas of gold a year. The gold is of good ley, and sold in the neighbourhood (in the year 1865) at 20 dollars the ounce.

Gold Mines of the Province of Paruro.—In the district of Ccapi, of the province of Paruro, between the towns of Coyabamba and Pocoray, there is a place called Virona, where various gold mines exist. Although the place is well supplied with gold, and has an agreeable climate, the earth which contains the precious metal is so very slippery, that it causes the mining work to be dangerous by the continual fallings-in which take place. There is a tradition that a subsidence buried eighty persons, on which account this deposit remains almost abandoned. The geological formation is a decomposed diorite; in the vicinity there is a stratified diorite. The gold of these mines is of very good ley.

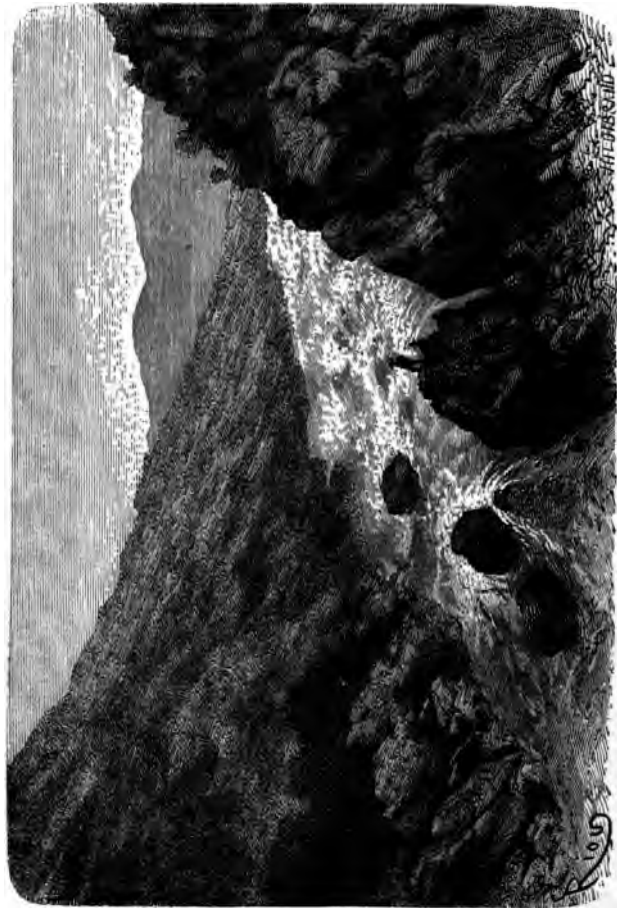
DEPARTMENT OF APURIMAC.

The Department of Apurimac, created in 1873, with the province of Andahuaylas, Department of Cuzco, has many gold washings, but most of them, the Sañayca, Carpani, Muya-Muya, Milmicuna, Auccampa, &c., are almost entirely abandoned. At present only the Huayllaripa washings are in working, although only on a small scale.



OLD DAM IN THE RIVER GAROTE.

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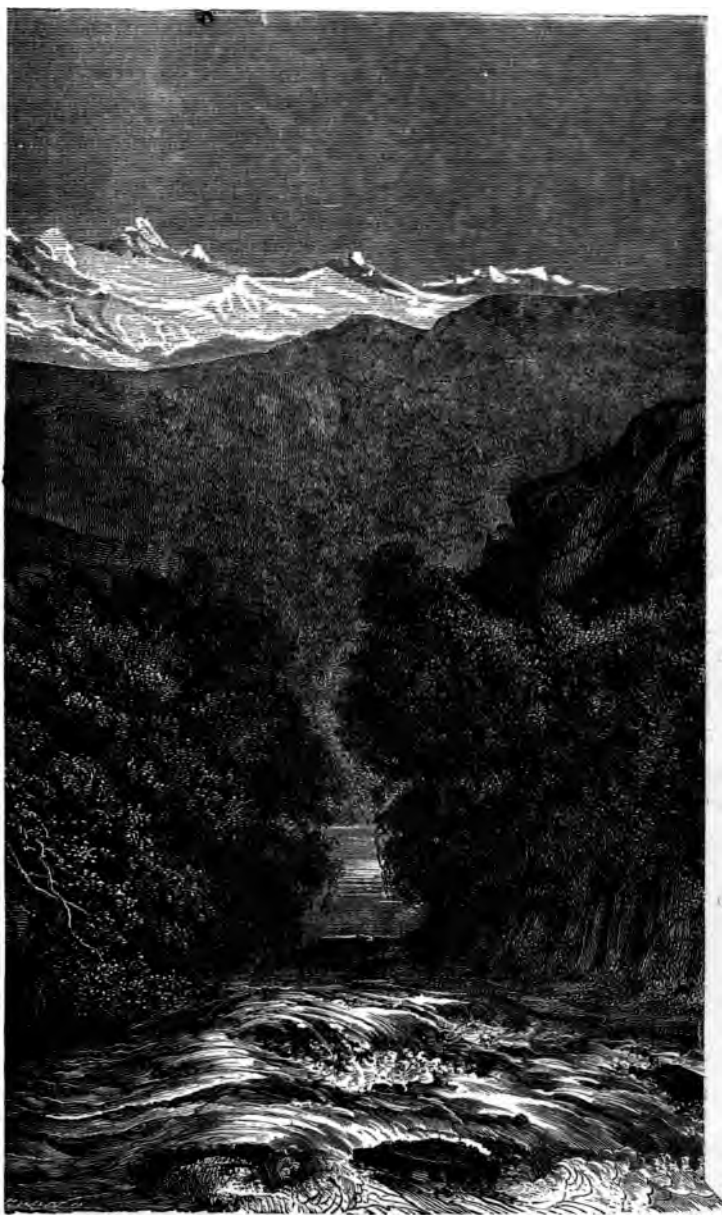


TORRENT STREAM, SANTIACA.

Face page 202.

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MOUTH OF THE RIVER CUCHOA.

Face pag

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Gold Washings of Huayllaripa.—The small town of Huayllaripa, whose inhabitants devote themselves almost exclusively to washing the auriferous earths, is situated on the left bank of the river Pachachaca, about four leagues from the town of Challhuanca, which is the capital of the province of Aymaraes. When I visited this place in August, 1865, the Huayllaripa washings were abandoned, so that I could only obtain a specimen of yellow auriferous earth, with small pieces of syenitic rock in a state of decomposition, and talcose slate. Having analysed this specimen it resulted in containing 1 grm. of gold per metrical ton, corresponding to one adarme or 20 grms. of gold per cajon. These washings, although worked for many centuries, certainly prior to the Conquest, were, however, until a few months ago, very little known, at least as regards their importance and production. We are indebted to Professor Olaechea, who visited these washings and those of Ayahuaya, for the very precise data respecting these auriferous deposits, published in the *Boletín de Minas del Perú*, from which the following is extracted:—"The town of Huayllaripa is found in the centre of a depression surrounded by deposits of alluvial earth of considerable thickness, which the Indians call 'Los Minas de Huayllaripa.' At the foot of the town there are seen conglomerates, gravels, and pebbles, porphyric, syenitic, and quartose, the conglomerates being more common in the gravels at the bottom of the valley. The deposits of auriferous alluvial are formed of argillaceous and ferruginous earth, with fragments of rock more or less rounded; or simply composed of limonite. The principal deposits are:—Santa Rosa to the N.W., Caccasmína to the N., and Pampamina to the E. and S.; only the Santa Rosa and Pampamina are at the present being worked. In the Santa Rosa mine fifteen persons work during the whole year, while in Pampamina only one man. As water is very scarce, in the dry season they use it alternately. The working of gold is carried on in Huayllaripa in a most primitive way, so that they hardly extract half which the earth contains. For this work water is brought to the deposit by small channels expressly excavated in the higher parts where the limonite predominates. The water falling from a height carries away the auriferous earth, at the same time producing deep, almost vertical, furrows. The lower part of these furrows communicates with other inclined channels, in which, from time to time, champas (turfs) in small horizontal flats, 1 mètre wide, are placed, upon which is laid a grass called Ichu. The water and soil passing forcibly through the channels, and coming in contact with the champas, the particles of gold are retained by the grass. After a few days the champas are collected and dried, and afterwards washed in troughs to separate the gold. The operation of drying is not practised in other places, but the gold workers of Huayllaripa say the gold 'matures' by this operation. After the first portion of gold is collected, the champas undergo another washing. For this purpose water is poured through a small channel, the bottom being covered with a small sheep-skin, with the wool cut off, upon which the finer particles of gold which escaped the first operation are retained. This gold-dust is washed from the skin in a trough and afterwards transferred to the

chua or puruña grande, with quicksilver, for amalgamation. The excess of quicksilver is strained off by means of a canvas bag, the amalgam rolled into small balls, and subjected to heat to expel the quicksilver, the gold being left behind. It has occasionally happened that dishonest individuals have put grounded stone, pieces of iron, &c., into the balls of amalgam to increase its weight. The rescataidores (traders who barter) are generally present at the making of these balls (which in the locality are called papillas), in order to avoid being defrauded. The gold of the Huayllaripa washings, the Santa Rosa, and the Pampamina is of deep yellow colour and very good ley, whilst that of the Caccasmina is of pale yellow and of low ley. Gold of Santa Rosa and Caccasmina occurs nearly always in a finely divided state, whilst in the Pampamina it almost always occurs as grains. Small nuggets have been found from a half adarme to 20 grms. in weight. The Huayllaripa mine is most active during the first three months of the year; being the rainy season, the quantity of water at disposal is more abundant. It is calculated that each person in the Santa Rosa mine extracts on an average during the rainy season 4 oz. of gold per month, and 6 oz. in the Pampamina. In the dry season the production of gold is reduced to $\frac{1}{2}$ oz. per month for each worker in the Santa Rosa mine, and to 1 oz. in the Pampamina. It is easy to calculate the annual production of gold of the two mines; the result from the Santa Rosa mine is 248 oz. of gold, and 27 oz. from the Pampamina. The value of the gold produced can be ascertained by calculating that if the gold is sold in Huayllaripa at 12 soles 80 cents. the ounce, it would realise 3,520 soles."

The Gold Washings of Ayahuaya.—About 10 $\frac{1}{2}$ leagues S.E. of the town of Challhuanca, in the district of Pachaconas, belonging to the province of Antabamba, is the town of Ayahuaya, with numerous washings in its vicinity. These washings were without doubt worked by the ancient Peruvians, as there exist indications of ancient workings, &c. The auriferous earths differ but little from those of the Huayllaripa, the only difference being that the Ayahuaya are looser. The principal auriferous deposits of Ayahuaya are the Lambraschayoc and Marcacahuana, being the only ones worked at the present time. The Ayahuaya Indians carry on the extraction of gold on a very small scale, the total production being about 250 oz., worth about 3,200 soles per annum. The production of gold in Ayahuaya compared with that of Huayllaripa is very small; however, if the production carried on only on a small scale and with primitive methods yields a lucrative gain of 3,200 soles, it is easy to conceive that much greater results would be obtained if the works were carried on with improved machinery.

Washings of Auccampa.—Recently I had occasion to analyse a sample of auriferous earth sent me from Auccampa, a place situated a short distance from Huayllaripa. The earth was almost entirely formed of limonite, or hydrated peroxide of iron, and, on analysis, yielded 2.2 grms. of gold per metrical ton (3 $\frac{1}{2}$ oz. per cajon).

Other Gold Washings of the Province of Antabamba.—Between the high hills which separate the Antabamba valley from that of Totorá and Oropesa, there are large plains with extensive gold washings, but

these are not worked on account of the coldness of the climate and the want of necessities, the region being very sparsely populated.

Auriferous Sands of the River Pachachaca.—The river Pachachaca, which waters the provinces of Abancay and Aymaraes, brings down in its sands a considerable quantity of gold, but not throughout the whole length of the river. It is only noticed a little below Challhuanca, increasing in quantity at the haciendas of Pampatama and Casinchihua, gradually diminishing as it flows on. The gold derives its origin from the deposits of Huayllaripa and Ayahuaya. It is not difficult to account for the decrease of the gold below Casinchihua, because the river Pachachaca, in its course through the Province of Abancay, has a much slower current, consequently it has not sufficient force to carry the weighty particles of gold.

DEPARTMENT OF AREQUIPA.

The Department of Arequipa is one of the richest in gold in the whole Republic. The Union Province is especially rich in gold. The principal mines in this province are Huayllura, Palmadera, and Montesclaros.

The Gold Mines of Huayllura.—These celebrated mines belong to the district of Sayla, and are situated in the Cordilleras called Alcallara, a ramification of the elevated Cordillera of Huanza. These mines were discovered in the year 1827, by Angelino Torres. The first were worked at a place called Pabellones; but the great output was in 1829, in the Copacabana mine, the vein of which runs N.N.E. to S.S.E., and where the gold is found in charperia, which occasionally showed gold in a solid mass. The discovery of gold in these mines induced a large number of people to come from all parts, and at the time of its greatest yield (1829-30), the district numbered 14,000 inhabitants, and in three years produced over \$6,000,000 worth of gold. The geological formation of this district is quartzose sand, of distinct colours, more or less compact, and disposed in a capas (stockwerk), much contorted, in some places being vertical. The upper part of this formation is covered with volcanic rocks. When I visited this place in December, 1865, there were a few miners possessing capital who were working the Pabellones, Desamparados, and Animas veins on a small scale, the first vein running E. to W. and the last N.N.E. to S.S.W. The Animas vein is almost vertical. The ore they were working at that time was very poor, and only now and then did they meet with any portions having a regular ley. The richness of the ore was reckoned at 1 adarme for each basket of 2 arrobas (82 grms. per metrical ton). The ore is refined in a primitive manner by means of quimbaletes; one man working the whole day cannot grind more than 6 arrobas. If with this antiquated system profit can be gained, it is clearly evident that by the use of modern machinery very much greater profits would be obtained.

Señor Babinski, who lately visited the gold mines in the Union Province on behalf of the Anónima Society, visited the Copacabana mine. He found the ore to consist of panabas, or grey copper,

which gave on analysis 8 oz. of gold and 36 marcs of silver per cajon, and 7 per cent. of copper. Señor Babinski is of opinion that the miners abandoned the place as soon as they perceived the ore did not contain visible gold. Huayllura is 4,330 mètres above the level of the sea, and the river Cotahuasi, in a deep ravine, is only 1,000 mètres. The Copacabana vein is almost vertical and descends to the river, consequently presenting a vast field for future exploration, as the vein is in almost virgin condition. The gold presents itself in a more or less quartzoze sand, varying to a fine quartz, which the French call "grés lustré." It is also found in a species of limonite, in a pulverulent condition, known as llampo, the gold being in the form of threads, more or less contorted. It is of very good ley, being equal to 96 per cent. of pure gold.

Gold Mine of Palmadera.—This mineral district, situated about 1 league below Huayllura, is 4,100 mètres above the level of the sea. At the present time there are only two or three huts on the lower part of the cerro, temporarily occupied by some pioneers from Sayla, who occasionally extract a little gold, afterwards leaving the place completely abandoned. The population of Sayla, the capital of the district to which the Department of Palmadera belongs, is about 5 leagues distant. The geological formation is a ferruginous sand. The veins are almost vertical, the direction being from E. to W. The principal vein is the Valencia, which contains gold visible to the eye. The auriferous hills are steep on the river-side, so that the mines are always dry.

There are numerous mines in Palmadera, among them some ancient ones with workings from 20 to 40 mètres, and others which are hardly commenced, so that the deposit offers a vast field for prospecting. What is wanted in Palmadera is not gold, but the necessary water to wash the metal. The scarcity of water compels the miners to transport the ores to a pampa two leagues off, where there is a small supply of water. The cost of transport is 6 soles per cajon. Almost all the material taken from the veins has gold visible to the sight, and yields 16 oz. per cajon (166·6 grms. per metrical ton).

The gold is found in a more or less metamorphosed sand. A rich specimen in my collection shows gold in quartzite, with small crystals of quartz. The Palmadera deposit closely resembles that of Huayllura, both in its geological formation and in the position of its veins; so that it may be said that the one is the continuation of the other. In fact, the mines extend over more than 3 leagues; the Palmadera being 2 leagues beyond Huayllura, in the direction of Charcana. In this area there are 32 mines, which have been more or less worked, but can still produce large quantities of metal. The mines, commencing at Palmadera, are:—San Roman, Santa Rosa, Quele Patria, Copacabana, San Gregorio, Napoleon, Santa Eulalia, Trinidad, Santa Barbara, Rosario, Ccorichacra, Espiritu Santo, Cruz de Mayo, San José, San Jorge, San Luis, Jesus Maria, Los Angeles, Bruno Mota, Carmen, Tenorio, Egocheaga, Alvarado, Tajo or Charpera, Tasta-huayco, Cahuitones or Quispi-huaman, Pucullani, Supa-cota, and Humapauciri. The latter is about 2 leagues from Huayllura. According to the report of Señor Babinski, it has an abundance of rich ores, samples having been obtained which exhibited specks of

gold, threads of silver and copper, in a native state. In spite of this, the mine is scarcely worked, on account of the rugged state of the country making it very difficult to reach.

Gold Mines of Montesclaros—These celebrated mines, which according to tradition yielded immense quantities of gold to the Spanish Government, are situated on the left side of the river Cotahuasi, on the side of a spur of the Cordillera, separating the river from the Salamanca. A great fall of earth and stones from the surrounding hills occurred in 1783 or 1797, burying the principal vein and a large number of workers; the mines were afterwards abandoned. Before this catastrophe occurred there existed the small town of Montesclaros, of which only the ruins of the church and some houses now remain. The climate is very temperate, the place being situated 2,260 mètres above the level of the sea. About a quarter of a league from the ruins of the town, near the river Cotahuasi, lies the principal vein, which it is stated was worked for the benefit of the King of Spain, and produced annually over 200 arrobas of gold. Señor Babinski visited this deposit in September, 1882, with the object of observing its condition; he calculated that the quantity of earth and stones covering the cerro does not exceed 9,000 cubic mètres, which could be removed by 200 or 300 workmen in three or four weeks, at an approximate expense of 4,000 silver soles. He discovered below this *débris* a gallery 40 mètres long by 0.50 mètres high, which he believes to have been opened by Señor Pierola, who undertook some workings here in 1835, but discontinued the work on account of the *débris*, and to have been made with the object of penetrating as quickly as possible the ancient workings. He surveyed the whole length of the gallery, but could not examine minutely the walls on account of the lowness of the roof; but he succeeded in obtaining a sufficient quantity of ore to make an analysis in a quimbalote and with quicksilver. From 22 lb. of ore he obtained 0.914 grms. of gold (8½ oz. of gold per cajon). Another quantitative analysis gave 8 oz. of gold per cajon. The mineral district of Montesclaros differs in appearance from that of Huayllura and Palmadera, as well in the nature of the rocks as in the position of the veins. The geological structure of the district is a dun-coloured slate, with lavas, trachites, and brachitic porphyries. The position of the veins, unlike those of Huayllura and Palmadera, is more or less horizontal, forming a manto.¹ The auriferous deposit is composed of copper pyrites of distinct colours, with quartz and sulphate of baryta. A sample of this auriferous ore, given me by Señor Babinski, is formed of numerous small stones, partly of quartz with limonite and chalcoppyrites, and partly of a bluish clay containing a little carbonate of copper. Another sample, from a new vein at Montesclaros, is composed of galena, with brilliant sides. It contains a small quantity of silver and a perceptible trace of gold. The district has the advantage of a fairly good water supply. Señor Babinski, in his report on the three deposits, Huayllura, Palmadera, and Montesclaros, is of opinion

¹ A manto is a horizontal mineral deposit without formation of veins.

that preference should be given to the Montesclaros vein, which only requires a small outlay of capital to put the mine in working again.

Other Gold Mines in the Union Province.—There are a great number of gold mines in the Union Province besides the three just mentioned, which are very little known, either from want of roads or the want of population. In many places in this province ancient quimbaletes can be seen, which were used in former times for the milling and refining of ores.

The Gold Mine of Picha.—On the left bank of the river Cotahuasi, about two leagues from Charcana, the capital of the district of the same name, is situated the town of Picha, in the vicinity of which there exists an old mine of auriferous galena. The metalliferous vein is over one metre wide on the surface, and runs in a dioritic rock almost vertical. A specimen of ore collected by Señor Babinski gave, on analysis, 41 grms. of gold and 492 grms. of silver per metrical ton (4 oz. of gold and 6 marcs of silver per cajon). It yielded also 50 per cent of lead.

The Gold Mines of the Cerro of Huanzo.—About six leagues N. N. E. of the town of Cotahuasi, at Antabamba, in the district of Huaynacota, rises the lofty cerro of Huanzo, the name given to a spur of the Cordillera. To the north there is a valley, in which potatoes are cultivated and sheep are reared; and in the slopes there are many old gold mines, in some the gold is found mixed with copper. The declivity of the cerro facing the river is formed of loose earth and stones, which roll down at the slightest blow. On this account a very rich mine in it is not worked. The mine is hardly three mètres deep; its mouth is supported by planks, called *collapo*. The people of the district occasionally work the mine, but on a very small scale, two or three weeks being occupied in extracting a few pounds of auriferous earth. The working of this mine is very original, since from fear of its falling in, they do not enter the mine, but extract the ore from the entrance by means of a long pole or cane, at the end of which is tied a kind of spoon; and after much patient work, they get out a little auriferous earth, which is formed of a loose limonite of a reddish-yellow colour, with native gold. The vein is about 20 fingers wide in the middle, and contains a variable proportion of gold; at times over one ounce has been obtained from a few pounds of earth. In Antabamba and in the Huanzo valley there are many quimbaletes of various sizes, belonging to the ancient Peruvians, some of which are used at the present time.

The Pararapa Mines.—In the district of Huaynacota, 3 leagues from Cotahuasi, in the Puna region, is situated the Pararapa Cerro with many viens and surface mines. The principal vein is of considerable extent, and has been worked in several places. Near the Cieneguilla Lake, is the Curihuaraca mine, which was worked by Señor D. Pedro José Honderma. In the Llamoca plain, at the foot of Pararapa Cerro, there are two mineral haciendas, at present neglected; in the vicinity there are many surface mines, the tailings from which form great heaps, which afford some idea of the importance of these mines. Señor Gastelú, who visited this place, found in these tailings some stones with gold visible to the eye, and entered several of the

old mines with the owner of the estate, Señor Apolinario Chirinos, and saw native gold in the walls of the vein, and in the quartz and slate forming the bridges or buttresses of the workings. One day's working yielded 1 oz. of gold, but the work was not continued on account of the danger of the mine falling in. In the interior of the mines there still exist the poles placed by the ancients, and, judging from the spacious passages they saw, these mines must have produced a considerable quantity of gold.

The Huayllapana Mines.—In the district of Huaynacota, and Pampamarca is found the mineral deposit of Huayllapana, situated in the Puna region. There are many ancient surface mines. At the present time the people extract a little gold by destroying the buttresses left by the ancients, occasioning the destruction of the mines. The gold from Huayllapana and Pararaca is not of high ley, as it contains 25 per cent. of silver. There are also many old quimbaletes.

Gold Mines of Coxchic.—About 5 leagues from Huaynacota, and 4 leagues from Huanzo, at a place called Coxchic, there are many veins of gold still in a virgin state. This deposit is situated in a puna with abundant pasture for llamas.

The Ocoruro Mines.—In Union Province, about 8 leagues from Alca town, are many surface mines and quimbaletes.

The Gold Mine of Condesuyos.—In the Salamanca district, in the province of Condesuyos, there are mines in Arirahua, Quiquimbro, and Aynacolca. These are very ancient, and at the present day are almost completely abandoned on account of the hardness of the ore and scarcity of gold. It is necessary to use powder to work these mines. The ley of gold has not exceeded 3 to 4 oz. per cajon.

Gold Mines of the Province of Arequipa.—This province has several mines in the following places:—

The Quebrada of Cachendo is situated between the Tambo valley and the Joya pampas, near the Arequipa railroad. Two specimens collected in the valley—the first, a silicate of iron, with distinct blue stains of silicate of copper—gold is found so minutely disseminated in the mass that it is difficult to collect the metal by washing the milled ore. A quantitative analysis of a quantity of ore gave a ley of gold of 93.74 grms. per metrical ton (9 oz. of gold per cajon). The other specimen was composed of quartz with talc and small copperous stains. This specimen gave on analysis a ley of gold of 83.33 grms. per metrical ton (8 oz. per cajon).

Gold Mines, 6 Leagues from Vitor near Sigwas.—Seven years ago I received from Arequipa a specimen of auriferous ore from this mine. It was very peculiar on account of the material in which the gold was found. This material is a kind of anagenite (sulphide of copper and arsenic), of reddish colour, formed in its upper part of coarse grains of quartz and talc, of grey colour with semi-metallic brilliancy, united by a cement of felspar and quartz in much finer grains. The gold is found scattered in this rock in very fine scales, visible to the eye, and very abundant.

The Gold Mines near Quishuarani and Huasamayo.—In the Uchumayo district, in the province of Arequipa, there are two places, called Quishuarani and Huasamayo, with auriferous quartz veins, but very

little worked. In Quishuarani there is a mill, where they refine the ore extracted from the mine, about 400 yards from the left bank of the river.

Gold associated with other Minerals.—A few years ago I received from Arequipa a specimen of ore, locally known as *liga colorada*, from the Carmen mine in the Cerro de la Trinidad, 2 leagues S.E. of Tiabaya. This ore is composed of cerusite (carbonate of lead), with silicate of iron (a kind of jasper), and green stains of chrysocolla (silicate of copper), which, on analysis, gave a ley of silver equal to 19.2 marcs per cajon, and 83.33 grms. of gold per metrical ton (8 oz. per cajon).

The Gold Mines of the Province of Camaná.—In the province of Camaná there are gold mines in the Achatayhua and Huanuhuanú hills. In the latter there are many surface mines, the principal being the Santa Rita mine. Four leagues from Chala there are various copper mines, and one of gold, called Lucmila. The richest locality in the province is Posco.

The Gold Mines of Posco.—These mines are 9 leagues from the town of Caraveli; although these are but little known, they have produced large quantities of gold, and have been worked with considerable activity for over forty years. The workings are very deep, with many surface mines in the same vein. The rock is syenite, varying to talcose. The Posco ravine is very narrow, and has a stream of water, which is used in the quimbaletes for grinding the ore. In this ravine there are ruins of many huts and a chapel, with stone walls cemented with mud, which contains gold. When I visited this mineral district (Nov. 18, 1863), there were two or three persons occupied in washing and re-washing the loose refuse earth to extract the little gold it contained. At the beginning of this year (1887) Señor Onorata Montoya began to work the Posco mine, and had the good fortune to find a small vein which produced half an ounce of gold from 6 arrobas of ore (208.2 grms. per metrical ton). The Posco gold is generally whitish and under ley, but there are several mines which yield the best quality gold.

DEPARTMENT OF PUNO.

Of the seven provinces comprising the Puno Department, only two contain rich gold mines—the Carabaya and Sandia. The provinces of Sandia and Carabaya are situated in the most remote region of Peru, bordering Bolivia, and are, for the most part, on the further side of the Eastern Cordillera, a continuation of those of Bolivia, where the elevated peaks Illimani and Sorata stand pre-eminent; so that, in order to enter these provinces, it is necessary to cross this gigantic chain by narrow, broken pathways. This region has produced, and still continues to yield, immense wealth, so much so that the Carabaya region has been considered the richest in gold in the whole of South America. Its gold mines are, without doubt, the most ancient, as the name Carabaya, more or less modified into Caruaya, Collahuaya, &c., is cited by ancient historians as a place very rich in gold. According to tradition a large nugget in the form of a horse's head, weighing 4 arrobas (100 lb.), was extracted from the Inahuaya ravine,

and another seen by Garcilaso,¹ the historian, resembling a man's head, was found in 1556 in a crack in the rock.

The Mines and Gold Washings of the Province of Sandia.—The province of Sandia, created in 1875, forms part of the ancient province of Carabaya, and the district of Poto, in the province of Huancane, contains gold both in the alluvial deposits and in the quartz.

The principal gold mines and washings of the province of Sandia are the following :—

The Mineral Deposit of Poto.—This important mineral deposit is situated in the south of the eastern Cordillera, traversing the province of Sandia, and near the source of the river, passing the town of Crucero, the ancient capital of the province.

Its climate is very cold, on account of its great elevation, 4,717 mètres above the level of the sea.

The gold is found in a brown soil, composed of quartz rock, slate, and a metamorphic sand with marly earth, distinguishing it from other auriferous earths, which are commonly of a reddish colour. The auriferous earth forms immense deposits, measuring three leagues in length, extending from the heights of Comuni and Ananea to the town of Poto. The auriferous earth contains many angular stones, which proves that they have not been subjected to the action of water, but that they have been brought down in thick masses of clay. Another fact in support of this is the mode in which the gold is presented; instead of being found in the lower part of the alluvial deposit, it is found throughout the mass; only in some parts of the marly earth, called *linqui*, no gold occurs. Large nuggets are not found in this deposit, the largest being only one adarme (hardly 1·8 grm.), the gold generally being very fine. Different names are applied in the neighbourhood to the gold, according to its division: *afrechoso* is gold in small scales, like bran; *natoso*, smaller, easily carried by water when washed in troughs; *polvillo*, gold finely divided, which commonly is extracted by amalgamation. The Poto deposit would yield large quantities of gold if a greater quantity of water were obtainable, but unfortunately it is very scarce, notwithstanding its being so near the immense Cerros Nevados. The water for the washing of earths is brought by means of an aqueduct from a small lake at the foot of the Nevado Comuni, three miles distant, to a depôt called Cocha de Pampa Blanca. This depôt supplies water to two others, one called Cocha del Carmen; the other, Cocha de S. Antonio. On account of the scarcity of water, the same system of working cannot be adopted as in the other places in the province, where large quantities of water are thrown upon the soil until the layer which contains gold is reached. In Poto they make a great number of surface mines, from 1 to 1½ yard apart; then opening a large hole in the earth separating one mine from another, finally cutting away the pillars or bridges, and allowing the ground to fall, an operation called *chaquipaqui*, cutting the feet. The soil dug away falls into a kind of aqueduct or channel, and is broken up, in order that it may be carried away by the water, the heaviest portion containing gold

¹ Garcilaso—"Comentarios Reales," libro viii., cap. xxiv.

and stones remaining. As soon as a certain quantity is collected, they remove the stones from the deposit which remains in the channel, and afterwards the earth, then known as *quinto*, and transport it to the machine, where the gold is extracted.

The Gold Mines in Cerro Ananea.—About three leagues N.E. of Poto, and in a nevado cerro near Comuni, are the ruins of the town of Ananea, respecting which there is no historical data. The remains of a church are standing, showing that it was founded by the Spaniards. The place is 5,210 mètres above the sea, in the region of perpetual snow. Near the ruined town are many surface mines full of water, in many of which are seen beautiful stalactites of ice. These mines are excavated in a manto, following the layers of ferruginous slate, the course of which is N. 15 E. to S. 15 W., inclining to the S.S.E. at an angle of 30° to 35°.

Two veins of quartz have been discovered in a dun-coloured rock, known as *lunar*; in one, a few inches wide, coal is visible; the other, nine inches wide, contains very fine gold. The cause of the abandonment of Ananea is unknown; but it is believed to have been owing to the discovery of gold in Poto, and the mines having filled with water.

Mineral Deposit of S. Juan del Oro.—There is no data respecting this celebrated deposit, nor of the opulent town of S. Juan del Oro, which appears to have been the first founded by the Spaniards in the woody region of Carabaya, forming part of the province of Sandia. It is remarkable that the place where the imperial town of S. Juan del Oro stood is not accurately known. Some believe that it was situated in the Quebrada of Sandia, while it is affirmed by others to have been in the Quebrada of Tambopata. Having had occasion to consult some ancient documents, I have come to the conclusion that the town existed in the Quebrada of Tambopata, about one league from a place called Villa, or Villapata, or Meseta de la Villa. According to tradition, the discovery of gold in Carabaya, and the foundation of the Villa de S. Juan del Oro, is attributed to some Spanish fugitives from the armies of Pizarro and Almagro. The town rose to 3,000 inhabitants; but the greed for gold divided them into parties, causing their fall, so that in 1768 Dr. Cosme Bueno says the celebrated Villa only reckoned SIX families of Indians, and as many Spaniards.¹ At the present day all the inhabitants have disappeared, and the site of the town is unknown.

The Mineral Deposit of Aporoma.—In a ridge dividing the rivers Machicamani and Pulipuli, which descend the Nevada Cordillera to the river Inambari, to the right of the road leading from Phara to La Mina, there existed in former times the Aporoma deposit, with its rich gold mines. Although it is unknown when gold was discovered and when the town was founded, at all events it was posterior to the foundation of La Villa de S. Juan del Oro. Aporoma has yielded immense quantities of gold, and in proof of the richness of its mines is the immense outlay which was made in constructing a road and an aqueduct over two leagues long, the greater part of which is cut in the solid rock. According to a manuscript in my possession, 997,000 castellanos of gold were expended in the construction of this aqueduct.

¹ Cosme Bueno—"Efemerides" for the year 1768.

The principal mines are Allpacato, S. Juan de Pablocoya S. Gerónimo, S. Bernabé, and Mirabella. These mines in the middle of the past century were very extensively worked, so much so that the working was only continued with difficulty and to little advantage. From that time the district rapidly decayed and became depopulated, so that at the beginning of the present century it was found, like S. Juan del Oro, completely uninhabited. However, in the last few years some mines have been worked.

Discovery of Gold in the Quebrada of Challuma.—It is scarcely fifty years ago since nearly all the gold mines in the province of Sandia were stopped, when some cascarilla gatherers discovered the presence of gold in a place called Quimsahuaci; but it was only in the following year (1849) that other persons, sent by Señor Pableto de Coaza in search of cascarilla, arrived in the Quebrada of Challuma and discovered large auriferous deposits. In a very short time they spread abroad the discovery of this valuable find; the forest and solitary quebrada was quickly peopled with eager searchers for gold. The magic power of this metal converted this remote corner of the Republic into a centre of commercial activity; a town was built which received the name of Versailles; a society was formed called Trasadina; and, lastly, no lack of quarrels and litigation in connexion with the ownership of the richest lands. Mining gangs overran the whole quebrada, and new aventaderos and rebosaderos were discovered, from which great wealth was extracted, so that they weighed the gold by romanas (ordinary balances) like common goods. All the deposits of auriferous earth discovered in 1849 and 1850 in this region were in this quebrada and in the Pucumayo. The places yielding a notable quantity of gold, commencing at the lowest part, are:—Pusupunco, San Simon, San José, Cangali, Cementerio, Altagracia, where from 15 lb. of earth 13 oz. of gold were extracted, and, lastly, Quimsamayo. In the Pucumayo valley gold was found in the Natividad, Talbahuasi, and San Pedro, from which a nugget weighing 27 oz. was taken, and from 3 lb. of earth 5 oz. of gold were obtained. Above this place are Santa Fortunata and Mercedes, where a nugget weighing 40 oz. was found; Media Luna, which produced a nugget of 29 oz.; Rosario, where another nugget weighing 36 oz. was found; and, lastly, a place called Carrizal. Gold is found in the rebosaderos in small scales and nuggets of various size. On one occasion I saw a nugget weighing 53 oz. extracted by Señor Rodríguez from the Quimsamayo mine. The gold is of good quality, almost always exceeding 23 carats. A specimen from this place on analysis yielded the following results:—

Gold	...	...	...	96'46	per cent.
Silver	...	...	...	2'50	„
Copper	...	...	...	0'04	„
Iron	...	...	...	0'30	„

The operation of working gold in the alluvial soils in the quebradas of Challuma and Pucumayo is conducted in the following manner:—A rebosadero being found, the trees and vegetation covering it are cut down, the carga or sterile earth which covers the venero is then re-

moved by means of water. For this purpose an aqueduct is constructed from the river at its highest point above the deposit. At the end of this aqueduct is a deep pit or reservoir called a *ccocho* (lake), with a flood-gate which, when opened, causes the water to flow with great force upon the earth; men armed with bars break up the earth into small pieces. This work is continued until the *venero* is reached, known by the presence of heavy stones of margajeta and humcho (pyrites and oligist iron). The stones, called *cascajeo*, are removed, and only the auriferous earth remains, which is called *quinto*. The final operation, known as the *lava*, is the name given in this province to a kind of canal with stone walls, where the gold is separated. The *lava* is constructed as follows:—In the inclined portion of the channel a smooth plank is fixed, at the end of which a hole is dug, beyond this a baize cloth is laid some distance along the course. Small cylindrical pieces, 3 to 4 inches in diameter, of the roots of the sano-sano are arranged transversely in the hole. These pieces are called *colon-colones*. On the baize is placed a mat made of canes, arranged crossways and tied at the ends. The auriferous earth, is thrown on to the plank and washed away by water, leaving the nuggets and larger particles of gold on the plank, the finer being retained by the *colon-colones*, and the still finer dust by the mat and baize.

The Gold Mines of Ccapac-orcco or Montebello.—Near the source of the Pucumayo, a branch of the Challuma, there is a very rich cerro called Ccapac-orcco (meaning rich cerro) or Montebello, which has very rich veins. In this cerro there is a vein called the Sacramento, which runs S. by E. to N. by W., almost in the same direction of the layers of slates which form the cerro. Near this vein is another, the Recompensadora, on the side of a quebrada S.S.W. to N.N.E., declining to the S. by E. at an angle of 30° to 35° . Several deep workings in this vein show that it has been worked with advantage. At the time I visited this cerro (October, 1864), a cutting was projected to run through the quebrada with the object of meeting these workings, to facilitate operations.

The gold is accompanied with quartz, commonly called *quijo*. This material varies in aspect, sometimes almost white, at other times showing reddish stains of oxide of iron, with several small cavities; stains of arsenical pyrites or mispikel, more or less auriferous, are common. The richness of the gold varies infinitely, from quartz almost sterile to very rich gold, occurring in the form of specks, threads, small leaves, or thick crusts, called *franja* or *charperia*. Quartz, with gold not visible to the eye, has given on analysis from 60 to 120 grms. per ton. Other samples, with gold visible in small specks, have yielded 200 to 500 grms. per ton, and specimens with *charperia* 2 to 3 per cent. The gold is of very good quality, as shown by the following analysis:—

Gold ...	...	...	...	...	97.10 per cent.
Silver ...	...	...	...	...	1.80 "
Copper ...	...	...	...	...	0.04 "
Iron ...	...	...	...	...	0.80 "

This specimen had the peculiarity of containing a larger proportion of iron than all the other specimens I have analysed.

Gold Washings in the Shoals of the River Huari-huari at Inambari.—Generally speaking, all the rivers in the province of Sandia contain gold, the richest being the Puli-puli, the Ccapacmayo, Pacchani, the Challuma, and the Huari-huari or Inambari. The workers not possessing the necessary capital to extract gold from the rebosadero, devote themselves to the washing of the river sand in large wooden troughs holding about 15 lb. each. The gold from the river Inambari is of superior quality, a specimen collected near the mouth of the Challuma, yielded

Gold	...	...	...	97'30	per cent.
Silver	...	...	...	2'40	"
Copper	...	...	...	0'03	"
Iron	...	...	...	0'05	"

Gold Mines of the Province of Carabaya.—This province, although not so well known as that of Sandia, is perhaps quite as rich in gold. Dr. Cosme Bueno, speaking of this province, says: "Almost the whole of the ground appears to be mixed with gold. When they clean the cistern of the spring in the square of Ayapata, they find in it chips and even small nuggets or grains of gold." The richest gold-bearing districts are Ollachea, Ayapata, Juata, Coasa, and Usicayos. The district of Ollachea contains a gold washing called El Asiento, worked many years ago but now abandoned. Ayapata with gold washings on the banks of the rivers Piquitiri and Cajitiri, affluents of the river San Gavan. Several years ago D. Agusta Aragon, owner of the Hacienda San José de Bellavista, in the San Gavan valley, discovering in the quebrada of Cajatiri the remains of a work made by the Spaniards to deviate the river, determined to work the auriferous sands. At the time of my visit to this remote region, I assured myself of the presence of gold in the sands of this river. The Juata district has some celebrated washings in the river Mucumayo, which together with the Caxili flow into the Ayapata or Esquilaya. The washings of Mucumayo were worked during the Spanish dominion, and in later times. The gold is sometimes found in large nuggets. One found in 1851 weighed 49 oz. 12 adarmes.

The district of Coasa has several washings, which are little known; the principal is that of Antiuno, situated in a quebrada of that name; the stream joins the Inambari on the right bank.

In the months of July and August the river Antiuno becomes for the most part dry, and dividing into several branches leaves small shoals of sand very rich in gold, but the working is somewhat dangerous, on account of the savages. Gold is also found in the Quebrada of Ancoccala, where there are many surface mines, veins, and rebosaderos. The district of Usicayos contains rebosaderos in the Quebrada of Macho-tocuma. The inhabitants extract gold from the shoals of the Inambari, by means of tocllas.

Gold Mines of the Province of Azángaro.—In the Muñani district,

¹ Cosme Bueno—"Efemérides" for the year 1768. Odriozola—"Documentos Literarios del Perú," vol. iii., p. 102.

belonging to the province of Azangaro, gold mines exist ; the principal one is the Caño-grande, which, at the commencement of the present century, produced one quintal of gold annually.

CONCLUSION.

It is evident from the foregoing that the places in Peru bearing gold are very numerous ; although all the places cited are either directly or indirectly known to me, it is probable there are many others which are unknown. Gold being so generally scattered throughout the whole of the Republic, it is really surprising that so many mines are abandoned, although they were previously worked with considerable profit. It is true there are mines which are not in favourable conditions to be worked, either from the small quantity of gold, the variableness of the veins, which at times present large spaces completely sterile, or from the want of the necessary water. There are, however, many which do not present any such obstacle ; and if the works were carried on, on a large scale, would give rich returns, *e.g.* the Santo Tomas mines ; those in the provinces of Pataz Union and Paucartambo ; in the washings of Pallasca, Huari, Chuquibamba, Huayllaripa and Antabamba ; the washings and rebosaderos on the banks of the Inambari, Mucumayo, and Aporoma.

The most important gold-bearing regions in Peru are, undoubtedly, the provinces of Sandia and Carabaya, and if as yet they have only yielded a small portion of the wealth they contain, it is not for want of gold and water, but from their being situated in the most remote corner of the Republic and the want of easy means of communication, the rugged pathways being only available on foot. To fully develop these auriferous deposits it is necessary to construct good horse-roads for the transport of the workers and machinery.

I am of opinion that before undertaking great expenses in the working of the mines and gold washings in these provinces, a company should be formed to prospect them, with the object of examining beforehand all the places where there is any probability of finding veins or deposits.

The river Inambari and all its tributaries ought to be carefully examined, and in the event of meeting with gold, it would be easier to discover from whence it came, surveying the quebrada to its source.

This class of work should be conducted by practical men, who have devoted themselves in California to discovering gold.

I do not doubt that with the opening of good roads, and a systematic survey of the Sandia and Carabaya provinces, the employment of machines like those used in California, Australia, and other places, this region will yield, for many generations, as large quantities of gold as that which made the name of Carabaya so celebrated.

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FINIS.

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Mining Exhibition in Lima, 1888.

IN order to give impulse and development to the Mining Industry of Peru, the Peruvian Government has resolved to hold a Mining Exhibition at Lima, to be opened on the 28th of July, 1888.

English manufacturers are invited to send exhibits. The articles which will be admitted are such as steam-engines, pumps, mineral crushers, gold and silver washing and testing apparatus, transfer railway waggons, electric lights, signals, &c.

All goods destined for the Exhibition must be so marked, and they will be admitted free of Custom House and Municipal duties.

By order,

H. GUILLAUME,

Consul-General for Peru, in Southampton.

January, 1888.

NOTICE TO ENGLISH EXHIBITORS

TO THE

Mining Exhibition in Lima, 1888.

English manufacturers desiring a representative at the forthcoming Mining Exhibition should communicate with Senor Don A. Espinosa, Mining Engineer, care of Doctor M. T. Espinosa, Calle de la Pelota, Lima, giving him particulars required for their exhibits, who will receive same and give attention to all instructions English exhibitors may send him.





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